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W. Uhthoff (Berlin). An Investigation of the Ocular Disturbances which accompany Multiple Sclerosis. *Berlin. Hirschwald.* 1889.

This very thorough and elaborate work, extending over about 180 pages, appeared first in the Archives for Psychiatry and Nerve Diseases, and is now published separately in two parts, the first of which deals with the pathological tissue changes, the second with the ophthalmoscopic appearances, the visual disturbances, the disorders of the ocular muscles, and the conditions of the pupil, which are met with in multiple sclerosis. The literature of the subject is already very large, and the ocular disturbances which accompany the disease have been minutely studied by many observers, especially by Charcot and his pupils ; yet, as the author points out, certain gaps still remain both in our clinical and in our pathological knowledge, and these he has attempted to fill.

During the course of seven years Uhthoff observed 100 cases of multiple disseminate sclerosis, watching many of them over long periods, and examining the optic nerves in five cases after death. The greater part of this material was met with in the clinic of Professor Westphal, the remainder in that of Professor Schoeler.

Pathological Anatomy.—The descriptions hitherto published of the optic-nerve changes in multiple sclerosis are for the most part brief, and do not go beyond the general statement that the tissue changes are analogous to those which occur in the brain and spinal chord. The author has minutely studied them with the microscope in five cases, and appends to his work a series of excellent drawings of nerve-sections made by himself ; to these he adds, for the sake of

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comparison, a series of drawings showing the changes which occur at different periods during the course of ordinary tabetic atrophy.

The cases are recorded with elaborate details, for which the original paper must be consulted. The conclusions arrived at concerning the nature of the process are summarised somewhat as follows :—

The optic-nerve changes which occur with multiple sclerosis have special characteristics which distinguish them from other forms of atrophy ; they stand midway between tabetic atrophy and that which follows interrupted nerve conduction on the one hand, and post-neuritic atrophy on the other. In the same nerve, and near to each other, may sometimes be found changes which cannot be distinguished from those of simple atrophy, and others which resemble interstitial neuritis. The first change appears to be a well-marked proliferation with growth of nuclei in the finer connective tissue elements between the nerve fibres ; this spreads to the larger septa which separate the bundles, and to the inner nerve sheath ; atrophy of the nerve-substance follows as a result of the connective tissue changes. Disappearance and destruction of the medullary sheaths is relatively rapid and complete, the isolated, or nearly isolated, axis cylinders being in many places permanently preserved.

In the blood-vessels are often to be found well marked changes, consisting partly in a multiplication and enlargement of the finer vessels, partly in alterations of the vascular walls themselves with proliferative changes around them ; obliteration of the lumen seems to occur rarely. There is no evidence that the vascular changes are primary, and the other changes secondary in point of time. Descending degeneration of fibres, as a result of a patch of sclerosis, is sometimes entirely wanting, and is often very slight, and this accords with the appearances seen in the papilla. The papilla may retain its normal appearance even in presence of extensive retrobulbar atrophy, and its atrophic discoloration is usually incomplete and partial even when section of the nerve immediately behind the globe shows a high degree of tissue change and shrinking. Longitudinal sections through the papilla exhibit the same small degree

of change in the non-medullated fibres and in the retina as compared with the extreme changes behind the globe.

A detailed explanation of the plates and of the methods employed in the microscopical examination completes the first portion of the work.

Chapter II. deals chiefly with the ophthalmoscopic appearances met with in the hundred patients. The sex and age of the patients are shown in the following table :—

Age.	67 Males.	33 Females.
1–10	4	2
10–20	2	4
20–30	18	9
30–40	22	12
40–50	16	3
50–60	4	3
60–70	1	0

Pronounced atrophy of the optic nerve with white or greyish-white disc was seen three times, twice in both eyes, once in one eye only, the other eye showing pallor of the temporal half only. In all three there was pronounced amblyopia.

Incomplete atrophy of the whole disc, the outer half usually being white, was seen 19 times; in 8 of these vision was good.

Partial atrophy of the temporal half of the disc, the inner half being normal, such as is often seen in toxic amblyopia. was seen 18 times, and in 6 of these vision was not affected.

Optic neuritis was present in 5 cases, and was of high degree in 3 ; it was monocular in 3, binocular in 2. Vision was affected in 4 out of the 5.

Normal ophthalmoscopic appearances were present in 48 cases ; in 5 of these there was however disturbance of vision, and in 1 of the latter, changes in the optic nerve were discovered by microscopic examination after death.

Accidental complications such as cataract, corneal opacity, synechia, were present in 7 cases.

Chapter III. describes the disturbances of vision met

with on clinical examination. Accurate measurements of the visual field in 24 cases gave the following results :—

Central scotoma, with intact periphery, was found in 13 cases. In 4 of these the scotoma was absolute, being binocular in 3, monocular in 1 ; in 9 it was relative ; binocular in 5, monocular in 4.

Central scotoma, together with peripheral contraction, was found in 2 cases, both binocular.

Irregular peripheral contraction, with relatively good central vision, was found in 8 cases, being binocular in 5, monocular in 3.

Regular concentric contraction of the field was found in 1 case only.

Thus among 24 cases, central scotoma was present in 15, being binocular in 8, monocular in 7. In some of these red and green were still perceived in the amblyopic area, but looked dull or clouded as compared with their appearance beyond this area—a disturbance of the visual function which would be easily overlooked if the examination were not thorough.

Concerning the onset and course of the visual disturbance accurate information was obtained in 22 cases. In exactly one-half of these the amblyopia came on rapidly, or even suddenly, in the remainder gradually ; in each class there were cases of monocular and of binocular amblyopia. A decided improvement of vision occurred during the course of the disease in 12 of the 22 cases ; in 2 recovery of normal vision was noted.

In 4 of these same 22 cases the amblyopia preceded all other symptoms of multiple sclerosis ; in two instances by an interval of from 2 to 3 years. The initial symptoms were those of retrobulbar neuritis.

In two instances a well-marked coincidence was noticed between the onset of visual disturbance, in the form of central scotoma and the occurrence of a paralysis in a different part of the nervous system. Again, it was noticed several times that excessive bodily exertion on the part of the patient produced an aggravation of the motor paralysis and of the visual disturbance simultaneously.

Comparison of the amblyopia of multiple sclerosis with that produced by other diseases of the optic nerve shows that retrobulbar neuritis, of the non-toxic kind, is the condition with which it has most in common. Thus in both the onset is frequently sudden, and there is often a decided subsequent improvement. In simple atrophy of the optic nerve, on the other hand, these characters are absent. Again, in both, there is frequently a partial atrophic pallor of the disc, and in other cases there is no visible change to explain the amblyopia. Between the two conditions, however, there is this difference, that in multiple sclerosis pallor of the temporal disc-half does not necessarily imply the presence of a central scotoma, while in ordinary retrobulbar neuritis the first seldom occurs without the second. This want of correspondence between the appearance of the disc and the condition of the field is characteristic of multiple sclerosis, and is probably due to the fact that the degeneration in the optic nerve is irregularly scattered and may lie immediately behind the lamina cribrosa, where it would have little influence on vision, whereas in retrobulbar neuritis certain definite fibre-bundles in the optic nerve, viz., those belonging to the macular region, are affected.

It is clear then that in certain cases of multiple sclerosis the oculist will diagnose retrobulbar neuritis. As regards the frequency with which retrobulbar neuritis will be found to depend on multiple sclerosis, Uhthoff states that among 204 cases, including the toxic kinds, 5 were connected with multiple sclerosis, *i.e.*, about 2.5 per cent.; including the toxic cases there were 7.5 per cent.

Spinal optic atrophy has less resemblance to the condition in question. Thus, central scotoma at the onset of the amblyopia is very rare ; the onset is never rapid or sudden, and the atrophy never remains monocular, or partial as regards the area of the disc ; the disc never remains normal in appearance.

Visual defects of true hemianopic character were not met with in a single case, which appears remarkable, since one would suppose *à priori* that the degenerative changes might occur behind as well as in front of the chiasma.

Chapter IV. deals with the disorders of the ocular muscles

caused by multiple sclerosis. They are of two groups :—1, true paralyses of the muscles; 2, nystagmus and the nystagmus-like jerkings which occur in certain positions of the eye: the two forms often co-exist. Charcot pointed out that both in multiple sclerosis and in tabes paralysis of one or other of the ocular muscles is frequently an initial symptom, and may subsequently disappear ; also that nystagmus is a symptom of high diagnostic value, for it is met with in about half the cases of multiple sclerosis, while in tabes and other chronic disorders of the central nervous system it is hardly met with at all.

Uhthoff gives the following statistics of ocular paralysis met with in his 100 cases of multiple sclerosis :—Paralysis of ocular movements was present in 17 cases; viz., paresis of the sixth nerve in 6 cases, binocular in 2, monocular in 4.

Paresis of the third nerve in 3 cases, monocular and partial in each instance, in 1 case the levator of the lid and the superior rectus being affected, in 1 the internal rectus, in 1 the superior rectus.

Paresis of associated movements in 3 cases; of lateral movements in both directions in 1 ; towards the left in 1 ; upwards, with slight limitation of other movements, in the third.

Paresis of convergence in 3 cases.

Pronounced ophthalmoplegia externa in 2 cases.

In about half of the foregoing, associated movements were affected, proving that the lesion was nuclear ; in some of the others also it was probably the same. In no case was there a complete paralysis of any individual nerve. In 100 cases of tabes similar paralyses were met with in 20 cases, but between the two groups there was this difference, that a co-existent nystagmus was much more frequent in the former than in the last named.

Nystagmus or nystagmic jerking during certain movements was met with in 58 of the 100 cases; namely, an actual nystagmus in 12, 1 of these presenting vertical movements, all the others horizontal ; jerking of the eyes during forced movements in certain or in all directions, in 46 cases. In no single instance was there either nystagmus or a tendency to jerks of a convergent or divergent type. Further

statistics show that, while nystagmus is met with in very many other kinds of nerve disorders, its frequency in multiple sclerosis is very much greater than in any of these, and the author explains this by pointing out that, according to experimental and clinical evidence, the cerebral regions from which nystagmus disturbance may arise are of wide extent, and that precisely in multiple sclerosis the lesions are numerous and widely scattered.

The final chapter deals with the condition of the pupils. Abnormalities in this respect are decidedly uncommon; they were found in only 11 of the 100 cases ; viz., loss of light reaction with myosis, binocular, in 1 case ; myosis with diminished reaction to light and convergence, 4 cases ; light-reaction much diminished, without myosis, 1 case ; marked difference in the size of the pupils, 3 cases ; diminished convergent reaction with good light reaction, 2 cases. Pupillary changes therefore, though they do occur, are much less common than in tabes.

In conclusion, the author points out that ocular symptoms have great diagnostic value in multiple sclerosis. It is remarkable that, while the affections of other cranial nerves point usually to central lesion, the visual disturbances are, as has been shown, chiefly due to morbid changes in the trunk of the optic nerve itself ; in this respect the optic nerve behaves as though it were a part of the central nervous system ; its terminal expansion, the retina, is not directly affected by the morbid process.

P. S.

WILLIAM THORBURN (Manchester). A Contribution to the Surgery of the Spinal Cord. *London: Charles Griffin & Company*, 1889. *Royal 8vo, pp.* 228.

This book is one of a type not uncommon in Continental schools of medicine, but by no means common among ourselves. It is a record of the clinical operations of a comparatively young surgeon in a limited part of his field, observations mostly made under his immediate chiefs, the physicians and surgeons of the Manchester Infirmary, but in the main made directly by himself, and having therefore

the advantage of homogeneity, which is often sadly wanting in clinical records. We have no intention of entering on the details of the subject, which mostly lie outside our province, but we may venture to express our opinion, after having perused Mr. Thorburn's treatise, that it is a most valuable contribution both to physiology and surgery, and a piece of the most genuine work recently published.

The titles of the various chapters will sufficiently for our purpose indicate the scope of the work. The first two chapters deal with injuries to the cervical region of the spinal cord ; the third, fourth, and fifth with injuries to the dorsal region, to the cauda equina, and the lumbar region respectively. The sixth chapter discusses the indications for operative treatment in affections of the spinal cord, and records some of the brilliant successes recently obtained in this department, while at the same time clearly indicating the restrictions to surgical interference. The seventh chapter is devoted to ophthalmoscopic changes in injuries of the spinal cord and in traumatic neuroses, and the eighth to traumatic hysteria, especially in relation to railway accidents. These last two chapters are of direct interest to ophthalmologists, and we may therefore discuss them somewhat in detail.

Mr. Thorburn commences Chapter VII. as follows:—"Few subjects have been less investigated, and on few is the information which we possess more conflicting, than on that of the changes seen in the fundus oculi after injuries to the spinal cord, the original observations upon the point being remarkably limited in number, while the references found in medical literature are mainly more or less accurate expositions of the work of but very few observers." In what follows he seems to us to have made good his indictment, and to have done something to fill the gap thus shown to exist. Of 38 cases of severe injuries to the spinal cord personally observed by Mr. Thorburn and recorded here, 17 were injuries below the level of the third dorsal nerve roots, and in none of the 17 were either subjective or objective symptoms of ocular affection discovered. The remaining 21 cases consisting of injuries above the second dorsal nerve, *i.e.*,

above the level of the "cilio-spinal centre," included 15 cases of fracture or dislocation, with one recovery, and six of intra-spinal hæmorrhage, four of which recovered, one of them living eighteen months after the accident. In no case, says Mr. Thorburn, either of recovery or of early or tardy death, did any subjective eye symptoms present themselves, and we may therefore, he concludes, assume that in none were there any serious papillary changes. This assumption may in the circumstances be correct, but, as it stands in general terms, we should not be prepared to subscribe to it. It is now well known that in about one-half of the cases of well-marked optic neuritis there is no affection of vision whatsoever, and the condition is revealed only by the routine use of the ophthalmoscope. In seven of the 21 cases, however, there were definite ophthalmoscopic observations, and Mr. Thorburn summarises these somewhat as follows :—In four cases of crush of the upper portion of the spinal cord (third cervical to second dorsal), where frequent examinations were made, ophthalmoscopic changes were found in three, being absent in one only ; in three other cases such changes were absent on the first, sixth, and sixteenth days respectively ; and in six cases which survived the accident for long periods no subjective symptoms arose, so that optic atrophy probably never arose. In the three cases known to be affected the changes consisted in haziness, with want of definition of the disc, accompanied by slight distension of the retinal veins. In the first case the changes ensued on the fourth or fifth day after the accident, they increased till the sixth day, but were not investigated at a later period. In the second case they had commenced on the third day, increased on the fifth, and been followed by effusion, obscuring the smaller vessels, before the ninth, after which death prevented further change. In the third case the haziness and congestion were found on the sixteenth day, but may have been present previously ; the right eye almost immediately afterwards returned to the normal condition, the left getting worse ; then the left improved, and the right again presented congestive changes, and finally, on the thirty-ninth day, both were normal. The changes in this last case were confirmed by Dr. Little, of Manchester. In

all the seven cases there was evidence of paralysis of the cervical sympathetic, narrowing of the palpebral fissure, and contraction of pupil, which last did not dilate on irritating the skin of the neck. It will be seen that Mr. Thorburn's observations are in opposition to Dr. Clifford Allbutt's, which are those usually quoted on this point. Mr. Thorburn finds ocular changes only in acute spinal changes, while Dr. Allbutt finds them only in chronic cases. In slight blows, bruises, and sprains of the back, Mr. Thorburn has found no changes in the optic discs. In 1870 Dr. Allbutt published a paper stating that, out of 13 cases of injury to the back, eight showed ophthalmoscopic changes, but he gave no details of the cases, and it is impossible therefore to judge what their real nature may have been. These eight cases of Dr. Allbutt's have, since 1870, done duty in a large number of publications, but little fresh material has been added, and it seems certain that unless gross basic meningitis has supervened on the original injury, no ocular changes result from such injuries to the back, whether simple and uncomplicated, or accompanied by neurotic or hysterical symptoms.

The last chapter of Mr. Thorburn's work deals with the vexed question of traumatic hysteria. The subject, like all those involving the question of "damages," is a thorny one, in which statements dogmatic are met by counter-statements equally dogmatic. Mr. Thorburn endeavours to consider the whole question from an unbiassed and philosophic standpoint, and the chapter is well worth perusal as a statement of what has been advanced on the subject. We end it, however, with a feeling that Mr. Thorburn is not sufficiently impressed with the capacity possessed by many human beings of both sexes for deceiving not only others but also themselves, where love of sympathy and love of money enter as disturbing factors. Neither in this chapter, nor in Dr. Hill Griffith's paper on the same subject, published in the "Ophthal. Society's Transactions," vol. viii., have we found clear proof that hysteria is other than a mental and moral disease, without gross organic symptoms directly dependent on it. Mr. Thorburn's final case, for example—hysterical hemianæsthesia and retention of urine followed by vomiting, cystitis and death from exhaustion

—the patient a girl twenty-four years of age, injured in a slight railway collision—carries, it seems to us, no weight whatever. Even had there been a *post-mortem* examination, and no gross lesion had been found, the case would have been but little more conclusive, and would still have remained absolutely apart from all cases of hysteria. That there is such a disease as hysteria, apart from malingering on the one hand and nervous exhaustion on the other, we readily admit, but it is well that the keenest scepticism, as well as the openest clinical mind, should be brought to bear on all cases apparently falling under the class, and we would say especially on all cases presenting the least evidence of definite organic disease.

Mr. Thorburn's work is illustrated by several good woodcuts, and the publishers have performed their part excellently. As a whole, the work is one on which Mr. Thorburn and his school may be warmly congratulated.

C. S. BULL. (New York). Extraction of Cataract without Iridectomy. *N. Y. Medical Journal, November 2nd*, 1889.

This paper contains a careful account of one hundred cases operated upon by the writer. It is not definitely stated that they were *consecutive* cases, but that is the impression given to the reader. After a detailed description of the *technique* of the operation, some remarks on the accidents which may occur in its performance, and the complications which may arise during the after treatment, Bull discusses the advantages and disadvantages of this method. These remarks and the summary of his cases we give in his own words. The paper concludes with a tabular statement, giving particulars of each case.

Comparison of the Two Methods of extracting Cataract with and without Iridectomy.—The *advantages* of simple extraction without iridectomy are as follows :—

1. It preserves the natural appearance of the eye, a central, circular, and movable pupil.

2. The acuteness of vision, other things being equal, is greater than after the old operation.

3. Eccentric vision and orientation are much better than by the old operation.

4. Small particles of capsule are not so likely to be incarcerated in the wound, and thus act as foreign bodies and excite irritation.

5. The necessity of after-operations is probably not so great as after the old operation.

The *disadvantages* of simple extraction are as follows :—

1. The *technique* of the operation is decidedly more difficult. The corneal section must be larger in order that the extrusion of the lens may be facilitated, as the presence of the iris acts as an obturator or obstacle to its passage. The corneal section must be performed rapidly so as to avoid the danger of the iris falling on the knife and being excised. The cleansing of the pupillary space and the posterior chamber is much more difficult than after the old operation.

2. Posterior synechiæ, secondary prolapse, and incarceration of the iris are more frequent than after the old operation.

3. The operation is not applicable to all cases. This objection, however, applies to all operations.

Indications for performing Iridectomy.—The indications for performing an iridectomy in cases of cataract extraction may be formulated as follows :—

1. When the vitreous is fluid or the zonula is ruptured, causing non-presentation of the lens and prolapse of the vitreous.

2. Insufficient length of the corneal section with prolapse of the iris.

3. Bruising of the iris during the operation.

4. A stiff, unyielding sphincter iridis.

5. Irreducible prolapse of the iris after the completion of the operation.

A few words in regard to the wisdom of the employment of general antiseptic rules.

1. The removal and exclusion, as far as is possible, of all bacteria by the employment of unirritating, aseptic fluids

for all purposes of cleansing and irrigation, the best of these being boiled water or boiled boric-acid solution.

2. The employment, whenever necessary, of some really valuable antiseptic solution, such as chlorine-water, mercuric bichloride, or silver nitrate, the indications for their use being the appearance of the slightest muco-purulent secretion from the conjunctiva, or cloudiness of the lips of the wound.

3. The fearless employment of the galvano-cautery to the whole length of the corneal wound, if the lips of the wound show any signs of infiltration.

4. The performance of the operation with the most extreme neatness and accuracy, and with the minimum of traumatism.

5. Endeavour to obtain primary union of the wound by careful removal from between the lips of the wound of all foreign substances, and by perfect coaptation of the edges, and the maintenance of the most complete immobility of the organ possible until the wound is firmly closed.

Of the one hundred eyes on which this operation of the "simple extraction" of cataract was performed, useful vision was regained in all save one. This case was that of a patient whose eye had been rendered entirely blind by frequent attacks of irido-choroiditis, and the lens was removed simply to allay the severe pain, and possibly to aid in quieting the inflammatory process. Not a single eye was lost from suppuration.

Fifty-two of the patients were males and forty-eight were females. The youngest patient was thirteen years old and the oldest was eighty-seven. The complications existing were as follows: Corneal macula or opacity in nine cases, broad arcus senilis in nine cases, old chorio-retinitis in six cases, chronic Bright's disease in five cases, chronic bronchitis and asthma in four cases, diabetes mellitus in two cases, dilated and immovable iris from a contused wound in two cases, conjunctivitis and marginal blepharitis in two cases, irido-choroiditis and blindness in one case, posterior synechiæ from old iritis in one case, pulmonary phthisis in one case, and hypertrophy and valvular disease of the heart in one case.

The reduction of the prolapsed iris after the extraction of the lens occurred spontaneously in fifty-six cases, and the iris was replaced by the spatula in forty-four cases. In eighty-three cases there was neither incarceration nor secondary prolapse of the iris. In fifty-three cases there were no posterior synechiæ or adhesions of the iris to the lacerated capsule. In forty-seven cases these adhesions were present, and in ten of these they were due to plastic iritis.

The healing process was normal in eighty-six cases, though in some the process was very slow, especially in the closure of the external lips of the wound.

Iritis of the mild plastic type occurred in ten cases, and retraction of the iris toward the ciliary processes in three cases. There was loss of corneal epithelium in two cases, and "striped" keratitis in one case. The wound became infiltrated in three cases, necessitating the use of the galvano-cautery. Choroiditis and hyalitis occurred in two cases, and irido-choroiditis with occlusion of the pupil also in two cases. Capsulitis followed in one case.

The accidents which occurred during the operation were as follows: 1, loss of vitreous in thirteen cases; 2, hæmorrhage into the anterior chamber in two cases; 3, complete collapse of the cornea in two cases; 4, dislocation of the lens in three cases; 5, the lens was removed with the blunt hook in five cases.

The duration of the treatment varied from eleven days, the shortest period, to forty-seven days, the longest period.

Secondary or after-operations were done in fifty-three cases—discission or laceration of the capsule in fifty cases, and excision of a piece of capsule or pseudo-membrane in three cases.

The resultant degree of vision in the one hundred cases was as follows: In six cases, $\frac{20}{20}$; in thirteen cases, $\frac{20}{30}$; in twenty-four cases, $\frac{20}{40}$; in twenty-two cases, $\frac{20}{50}$; in twenty-one cases, $\frac{20}{70}$; in ten cases, $\frac{20}{100}$; in two cases, $\frac{20}{200}$; counting fingers at several feet in one case. No perception of light in one case, eye previously blind for many years.

J. B. L.

SUAREZ DE MENDOZA (Angers.) Suture of the Corneal Wound after Cataract Extraction. *Rec. d'Ophtalmol. September*, 1889.

In this paper, which was communicated to the Ophthalmological Society of France in August, 1889, the author describes the plan he has adopted of bringing together by suture the lips of the corneal incision in cataract extraction. He had, at the date at which his paper was read, operated by this method upon a large number of rabbits, one dog, and fifteen human beings; in all these cases he obtained good results. Short accounts of his first eight human cases are given, which more briefly stated are as follows:—

(1) F., æt. 65; six weeks later V. = 1; (2) F., 65 (same patient), iritis occurred, six weeks later V. = $\frac{2}{3}$; (3) M., 25, traumatic cataract; the eye was well ten days later, V. not stated; (4) F., 73, one month later V. = $\frac{2}{3}$; (5) M., 65, hypopyon-iritis followed operation, subsequent iridectomy gave V. = $\frac{1}{2}$; (6) M., 49, eleven days later V. = $\frac{2}{3}$; (7) F., 58, ten days later V. = 1; (8) M., 25, traumatic cataract, escape of vitreous during operation; two weeks later V. = $\frac{2}{3}$.

In his earlier operations the author employed three sutures of very fine silk, but found subsequently that one stitch answered as well in most cases. A horizontal incision is made at the upper border of the cornea 5 or 6 mm. long, and extending through $\frac{2}{3}$ the thickness of the cornea. The suture is then passed through the two lips of this wound, about 2 mm. from their margins. This may be done in one or two steps, but the suture must not be carried more deeply than the bottom of the corneal incision, from which it is drawn out in a loop and held aside. The extraction is then performed in the usual way. After returning the iris completely the lips of the wound are brought intimately together and the suture tied. Subsequently two more stitches may be inserted if desired; the author states that once the middle thread is tied, other stitches can be introduced without difficulty. The silk is removed from the fifth to the tenth day. A special form of speculum and a

guarded knife for making the first incision are recommended, but do not seem to be essential.

The writer claims many and great advantages for this operative procedure, perhaps the chief of which is the greater control obtained over the iris; with the wound kept closed by one or more stitches there is very little risk of it being reopened during the first few days by the voluntary or involuntary movements of the patient. It is also a decided gain to be able to close the wound in cases in which the operation is complicated with escape of vitreous.

J. B. L.

OPHTHALMOLOGICAL SOCIETY.

November 15th, 1889.

The Bowman Lecture on "The Pathogeny of Divergent and Convergent Strabismus."

By Edmund Hansen Grut, M.D.,

Professor of Ophthalmology in the University of Copenhagen.

(*Abstract by the Author.*)

Habit and exercise play an important part in the production of the normal movements and positions of the eyes. The same influences obtain for abnormal positions, as in squinting.

The absolute concomitancy of lateral and convergent movements which appears on occlusion of one eye, when the primary and ordinary motives for the movements (fusion of images, accommodation, consciousness of distance) are absent, is a proof of the power of habit.

Simultaneous abduction of the two eyes is impossible, not because any hindrance exists in their externi, or because a centre for divergence is wanting, but simply because such a divergence would be detrimental to single vision; habit and exercise in divergence are wanting.

To understand the origin of squint, it is of importance to study: (1) The position of normal eyes on fixation of a distant object. (2) The position of ametropic eyes on fixation of, and accommodation for a near object.

(1) The object of the first examination is to find out the starting point for all movements, the *anatomical position of rest*, viz., that which is the result of the form and direction of the orbits, of the length of the muscles, of the state of aponeurotic surroundings, mode of insertion of the optic nerve, etc. This position is generally examined by occluding one eye, during fixation of a distant object straight before the individual. If, under occlusion, the eye retains its parallel position, we say the anatomical position of rest is one of Parallelism ; if it diverges or converges, we talk of a divergent or convergent position of rest. The same may be done with a prism held vertically before one eye. But, as is well known, we cannot be sure that we are right in our conclusion, because an occluded eye may continue parallel to its fellow, notwithstanding a divergent anatomical position of rest. This is owing to habit. In a wakeful state no divergence is allowed, because diplopia would result ; gradually the habitual suppression of divergence remains even on occlusion of one eye. In the case, therefore, of a divergent anatomical position of rest, this is the starting point for convergence, and we may say, that a part of the territory of convergence (the part from the divergent position of rest to the habitual parallelism) is latent, just as a part of hypermetropia is latent. In both cases it is a habit, enforced in the one case by the requirements of binocular, in the second by those of distinct vision, which prevents the perfect relaxation of the interni and the ciliary muscle respectively. In both cases an unconscious innervation keeps up the necessary muscular contraction. The position of rest, which we thus find behind the occluding hand is not the real anatomical, but a *functional* position of rest.

An anatomical convergent position of rest could not be masked by habit because convergence is habitual ; there is no habit of non-convergence, as there is of non-divergence.

All our experience, in fact, goes to show, that a divergent position of rest is natural to the eyes. Thus :

A divergent position of the occluded eye is very frequent :

A convergent position in comparison excessively rare :

The parallel position is undoubtedly that most frequently found :

The orbits with their contents are always divergent : (But the divergence varies considerably in degree ; this great variation should be attended with a corresponding variation of the visual axes. When, therefore, notwithstanding this, the parallel position is found to preponderate, it seems likely that in many cases parallelism is a functional, not an anatomical position of rest.)

In deep sleep and narcosis the eyes are generally divergent :

After death a divergent position is the rule.

A blind eye may, after cessation of all convergent movement, take up any position, which happens to be the position of rest. Here again divergence is most frequently found. As I shall show further on, this cannot be due to a preponderance of the externi acquired in consequence of the cessation of convergence, but only to the eye taking up the anatomical position of rest.

Landolt, Schneller, and others agree with me in considering the parallel or divergent position as the natural position of rest.

Schiotz of Christiania, and Stilling of Strassburg, on the other hand, believe that a convergent position is most frequently found. The latter finds it in nearly all cases of hypermetropia and emmetropia. I am positively certain that this convergence found by Stilling is not, as he believes, the anatomical position of rest, but merely a functional one. The reasons for this require a lengthy exposition, which cannot here be entered upon.*

(2) The positions taken up by the eyes with ametropia on accommodation for near objects.

In emmetropes the relation between Nagel's mètre-angle and accommodation in dioptrics is, as a rule, perfect ; exceptions do, however, occur.

In hypermetropes, a similar relation between the mètre-angle and accommodation would produce convergent squint. This is not the case generally, owing to the facility with which young hypermetropes adapt themselves to circumstances, but we very often do see a latent convergent squint.

* They will appear in the Oph. Soc. Trans. 1890.

In myopes, the relation between the metre-angle and accommodation produces latent divergent (relative) squint, and this is, undoubtedly, the rule.

Not unfrequently, however, we see that the eye behind the occluding hand remains in an approximately correct convergent position (v. Graefe's Normal Myopes). The motive for convergence here at work (notwithstanding the absence of the ordinary impulses to convergence, viz. fusion and accommodation) is the consciousness of distance ; the knowledge that the fixed object is near, is sufficient to keep up an approximate convergence, especially when the individual has great facility in convergence. It is therefore mostly in young myopes that this motive for convergence is active. I consider this motive for keeping up a continuous convergence as being of considerable importance for the production of convergent squint in myopes.

We may consequently say, that in ametropia there is a pronounced tendency to latent squint, in hypermetropia to convergent, in myopia to divergent (relative) squint.

The question is often put, Why do not all hypermetropes squint ? The general answer is that it only happens in hypermetropic eyes, when well-known favouring circumstances (unequal vision in the two eyes, etc.), are present ; but this does not always obtain. Some hypermetropes squint without the existence of these favouring circumstances, and others avoid squinting in spite of them. The real reason is that the power over the muscles varies. Most persons can learn to dance, to perform gymnastics, etc. A few are duffers, and never learn to stand on their own feet. For the same reason most hypermetropes can learn to adapt themselves to circumstances, and avoid squinting. Some few cannot. It is therefore more the mastery over the action of the muscles than the presence or absence of the favouring circumstances which decides the question. The millions of non-squinting hypermetropes are proof that the tendency to squint is overcome by the majority.

My conception of the nature of squint may be expressed in the following terms :—

(1) Convergent squint originates in, and is maintained as the result of, an innervation, which induces in the interni

a shortening exceeding in amount that which is desirable. When this abnormal innervation is temporarily or permanently suspended, the squint disappears. We must therefore renounce any idea of structural muscular change.

(2) Divergent strabismus is the expression of a relaxation of convergence innervation, which permits of the eye taking up its anatomical position of rest. It can, therefore, in the absence of any paresis, or abnormal condition of the muscle, only arise when the anatomical position of rest is a divergent one.

It will thus be seen that, according to my views, divergent squint is the perfect antithesis of convergent squint, in its mode of origin as well as in direction.

Convergent Strabismus.—A pure concomitant convergent and accommodative squint is, as far as the muscles are concerned, analogous to a convergence effected in the interest of binocular fixation. Take, for instance, the case of convergence towards a point at the distance of 8″. The eyes here move together in lateral directions, as they do in fixation for a distant object, minus the continuously maintained convergence for 8″. If the object be held, for instance, so that the right eye, in order to fix, is directed straight forwards, the left eye must then be turned forcibly inwards. This does not, however, raise in our minds any doubt that the convergence-innervation is equally great in both eyes, as this position is the result of a binocular convergence for 8″, with which there is associated a binocular rotation to the right. Half of the inward rotation of the left eye is therefore the result of a convergence innervation, the other half of an associated lateral rotation. (Hering.)

Now, in an accommodative, hypermetropic squint, the same obtains.

As far as the muscles are concerned, it is the same whether the convergence takes place in the interest of binocular, or of distinct monocular vision. Consequently, in every squint, dependent upon a shortening, due to innervation, the inward rotation of the squinting eye is only to the extent of one-half of its amount an expression of a convergent movement, while the remaining half is the result of an associated lateral movement. In other words, squinting

is an entirely bilateral deviation, although at a particular moment it only appears in the one eye.

In *permanent* squint, however, excessive convergence remains, notwithstanding cessation of accommodation. On accommodation and sharp fixation an additional convergence takes place. Why does the squint become permanent when there is no accommodation to bring on the convergence? We have seen that, under ordinary circumstances, habit secures parallelism notwithstanding a divergent anatomical position of rest, and renders latent a part of the territory of convergence; similarly, in permanent squint, the habitual excessive convergence makes a still greater part of the territory of convergence latent, thus displacing the functional position of rest inwards to a greater distance from the anatomical position of rest. The habit of continuous excessive convergence prevents the complete relaxation of the interni. I shall presently adduce proof that the permanence of the squint cannot be due to an anatomical shortening of the interni, and shall mention now some facts that go to prove that the squint is maintained by an innervation to contraction.

In deep chloroform narcosis we sometimes see complete disappearance of a permanent convergent squint. This is, however, not the rule. But what we always see under chloroform is, that the eye, immediately after tenotomy, flies outwards to a considerable extent, sometimes to parallelism or even beyond it. On awakening, a more or less considerable convergence is resumed. Now, the physical state of the muscle is the same under, as after chloroform, and the change in the position on awakening must arise from an innervation to contraction.

Again, after tenotomy for convergent squint, when the mal-position has been but partially corrected, one very often finds the secondary squinting angle considerably greater than the primary. The reason of this is obvious. The correction is due to the retrocession of the muscular insertion, but the eye is retained in the new, corrected position by the same amount of contraction of the internus as before tenotomy. The externus of the squinting eye must therefore, when the eye fixes an object, use the same force to

overcome the unaltered resistance from the internus as before tenotomy, although the distance through which it has to carry the eye outwards has been diminished. In consequence, angular measurement of the secondary squint remains the same as before operation, notwithstanding the diminution of the primary squint. This could not be the case if the squinting were due to an anatomical shortening of the muscle. Besides, one never finds this to be the case after tenotomy in divergent strabismus, in which the externus is not contracted.

In some cases the squint is *periodic*. On cessation of accommodation (during "vacant stare") there is apparently no strabismus. It is generally believed that it is adhesion to binocular vision which prevents the squint from becoming permanent. This is undoubtedly true sometimes, but there are cases in which vision in one eye is so defective that binocular vision could not possibly be the cause of the periodicity of the squint. The cause in these cases is probably that the anatomical position of rest is more divergent than usual. The squint that takes place on accommodation removes the functional position of rest inwards, as in ordinary squint; but, owing to the greater divergence of the starting point, the functional position of rest comes to coincide so nearly with parallelism that there is no apparent squint. Ulrich considered that the reason for the squint remaining periodic was an insufficiency of the interni. I believe it to be the more divergent position of the starting point for movement of the eye. It is evident that this is quite different from a muscular insufficiency, which presupposes an impossible muscular anomaly.

We even find cases where there is a convergent squint during excessive accommodation, and a divergent squint on vacant stare. This may be caused by a still greater divergence of the anatomical position of rest.

It is an undoubted fact that one finds convergent squint in other states of refraction than hypermetropia; this has led some authors, especially Schweigger, to reject Donders' views. I shall, therefore, proceed to consider

Convergent Strabismus in Emmetropia.—In probably the majority of cases there is a marked tendency to increase

of the refraction as growth proceeds. Hence it may be considered likely that in many cases of strabismus in emmetropic individuals, the refraction at the time when the squint arose was hypermetropic. Moreover, Donders showed that a diminution of the range of accommodation, even in emmetropia, might give rise to squint. Such a diminution occurs after diphtheria and other diseases. Schweigger considers this to be a mere assumption. We do not know that such a diminution really existed at the time, and we would not, as a rule, be able to examine the range of accommodation, owing to the patient's age. Moreover, we do not see squint after diphtheria, except when there is at the same time a paresis of the externus. If the paralysis of accommodation caused the squint, we should expect to find it in the numerous cases where atropine is used, and this I do not admit. If we are not allowed to admit the possibility of a transient paresis of accommodation, because we could not examine the eyes at the time, Schweigger would certainly not be justified in advancing as a proof that hypermetropia plays a very subordinate rôle in the origin of convergent squint, the fact that we find many squinting emmetropes ; the majority of such cases, which he gives in his statistics, he certainly did not examine when the squint commenced ; he, therefore, could know nothing of the state of refraction.

The reason why atropinisation does not cause squinting is obvious. The paralysis is here complete, and the temptation to a perfectly unavailable accommodation can, therefore, not be great ; besides, the great majority of patients under the influence of atropine are well versed in binocular vision, and not likely to abandon it easily. But when the well-known favouring circumstances (anisometropia, etc.) exist, we do actually find that squinting may occur in atropinisation and after diphtheria.

I mentioned that on examination of emmetropic eyes—although the harmony between the mètre-angle and accommodation as a rule is perfect—we occasionally find exceptions ; convergence sometimes is in excess of accommodation (producing latent convergent squint on fixation of near objects). This may cause a removal inwards of the functional position of rest, and thus produce permanent squint.

Another cause is the following: young children are apt to place books, or other objects with which they are occupied, exceedingly close to the eyes. This has been considered the cause of the so-called "spasm of accommodation" which leads to myopia; in other words, the functional myopia induces real myopia. It is a well-known fact, that when young persons have read or drawn for many hours, they see distant objects badly for some time after. This is generally ascribed to the above-mentioned "functional" myopia; but I know of well-authenticated cases where the dimness arose from excessive convergence with well-marked homonymous diplopia. This is generally transient, but it may eventually produce permanent squint, in spite of emmetropic refraction.

The above-mentioned causes of squint in emmetropia are certainly not frequent, but the number of emmetropic squinters is very much smaller than that of hypermetropic squinters.

Convergent Strabismus in Myopia.—Everybody is aware of the very great difference between the symptoms in this form of strabismus and that occurring in hypermetropia. As a rule, it is a relative squint, seldom occurring at the reading distance or nearer, but beginning beyond this distance, and increasing in degree as the object of fixation is removed further from the eyes. It occurs later in life, has a tendency to increase, and any one who has had the opportunity of seeing this class of patients for a series of years may have observed how the squint increases from perfect parallelism, or the slightest convergence for infinite distance, up to considerable convergence. Graefe attributed it to a defect in the power of relaxing the interni. I believe this to be the correct reason. It only remains to explain why so comparatively few myopes suffer from it. I believe the explanation to be the following:—

As a rule, there is in myopia, as we have seen, a tendency to latent relative divergence, owing to the existing harmony between the mètre-angle and accommodation. Such myopes will find, intentionally or accidentally, frequent opportunity for occluding one eye, which then diverges. The frequent relaxation of convergence will consequently prevent the

removal inwards of the position of rest. A relative minority of myopes have an approximately correct position of the occluded eye, owing to consciousness of distance, combined with exceptional ease in converging. When such myopes constantly are occupied with near work, there never is a perfect relaxation of the interni, not even on occlusion of one eye. For a greater distance fusion is weak, owing to the myopia; and the stimulus to relax the externi comparatively small. Such myopes are apt to get convergent squint.

From these remarks it will be seen that I unhesitatingly adhere to the opinion that convergent squint is due to an unconscious contraction resulting from innervation. Of all causes inducing frequent and constant convergence, hypermetropia is undoubtedly the most common, but other motives for convergence, which are in constant requisition, and are not corrected by a regular and frequent cessation of the contraction, may give rise to a transposition inwards of the position of rest, and consequently to a permanent squint. The necessity for frequent or uninterrupted convergence leads to a habit of convergence; internal squint is therefore in a sense a habit, but one which is a consequence of conditions originally dictated in the interests of vision from which the individual is unable to free himself.

Strabismus Divergens.—We know little of the innervation of the externi when they act in combination with the interni. (For further particulars regarding this point I must refer to the full report of my lecture.) If the supposition is right that the anatomical position of rest is the starting point for the action of the interni, it must be the same for the externi. But whereas from this point convergence in all degrees is feasible, simultaneous divergence of the two eyes is impossible. The very small degree, which is known by the name of "facultative abduction," may not be an effect of simultaneous contraction of the externi, but is much more likely to be the consequence of the greatest possible relaxation of the interni, owing to which the functional position of rest gives way to the anatomical position of rest. I believe that the absence of a simultaneous contraction of the externi, which could bring

the eyes beyond the anatomical position of rest, is of great importance.

The frequent occurrence of strabismus divergens in connection with myopia, and its onset late in life is a well-known fact. Donders' explanation of its origin I need not here repeat. There is, however, one point on which I entirely disagree with Donders. Myopia can only explain a relative divergence, latent or manifest. When Donders implies that finally the relative divergence becomes absolute, on account of the constantly increasing preponderance of the externi, I am unable to follow him. I may, in passing, mention that the occurrence or absence of absolute divergence has no relation to the degree of relative divergence. The greater this latter is, the more likely is it finally to become absolute. This is not the case. We even occasionally see persons with no power of convergence at all, who nevertheless do not get absolute divergence. The impossibility of converging can no more cause absolute divergence and preponderance of the externi than an impossibility of simultaneous divergence (which is the natural condition) can induce absolute convergence and preponderance of the interni. Whether absolute divergence arises or not depends upon the anatomical position of rest. If this is parallel, complete cessation of convergence leads to nothing but parallelism. If it is divergent, this position will finally be assumed. Strabismus divergens owes it origin, therefore, solely to a cessation of convergence; there is no contraction or shortening of the externi. The difference in the pathogeny of divergent and convergent squint is seen by the difference in the effect of tenotomy. This effect depends on the retraction of the divided muscle and on the state of its antagonist. We all know that in manifest divergent strabismus the effect of tenotomy is very small as compared to the effect in convergent squint.

I know quite well that there are many cases of squint for which my explanation of its origin will not suffice. I am aware, moreover, that I am unable to prove several of my hypotheses. But has the theory of an anatomical change in the muscle as the real cause of squint been proved? It is evident that this muscular theory is by far

the most generally accepted. Schweigger has taken up the most decided position against Donders. According to him, as we find both convergent and divergent squint with all states of refraction, the latter cannot be the essential basis of squint. He holds that it is necessary that there should be elastic shortening, or preponderance of the interni in convergent, or of the externi in divergent squint, combined with "insufficiency" of the respective antagonist. I unhesitatingly declare that I do not know what "insufficiency," other than paresis, means. Insufficiency of a muscle must lead to absolutely the same symptoms as paresis; that which characterises both conditions is, that to produce the same degree of rotation as would be effected by the normal muscle, or by a normal conductibility of the nerve, a greater than normal impulse is required. If difference there be, I would characterise the "insufficiency" as a paresis, the seat of which is in the muscle, whereas in ordinary paresis the cause may reside anywhere from the periphery to the centre. But how these conditions can be distinguished is a puzzle to me. How does such an "insufficient" externus co-operate with the normal internus of the other eye, and what becomes of concomitancy?

Elastic shortening of the muscle has never been demonstrated anatomically.

Schweigger admits that hypermetropia and convergent squint, myopia and divergent squint, are most frequently combined, but considers this combination a mere coincidence. How and when the elastic shortening originates he does not tell us. It certainly cannot be congenital, for if so, why should squint begin from the third to the sixth year (and divergent squint even later)? The tendency to fusion would decidedly be least developed in the first years of life. If, on the other hand, it is acquired, it seems unnatural not to believe that it is in some way caused by the state of refraction with which it is most frequently found. Besides, all the small degrees of elastic shortening would be easily overcome in perfectly normal eyes, and we should thus expect to find many more persons who had latent convergence. I have already stated that I have found latent convergence for distance a relatively very rare occurrence.

Schweigger thinks that hypermetropia and myopia have something to do with convergent and divergent squint, but they are merely adjuvantia ; a hypermetrope without elastic shortening of the internus will never come to squint.

The reason why elastic shortening produces latent squint we do not know. When the ordinary favourable circumstances concur (and amongst these principally hypermetropia and myopia) the squint becomes manifest.

Alfred Graefe, too, believes that in every permanent squint the muscle is in a state of passive anatomical shortening, but, in opposition to Schweigger he thinks that the shortening is consecutive to the squint, which the anomaly of refraction has called forth. This is a compromise between the two opinions : shortening from an impulse to innervation, and an anatomical shortening. I believe Graefe's opinion is the most popular. It seems to be generally believed that a muscle, originally obeying a nervous impulse to contraction, cannot ultimately escape structural changes, which render the squint permanent. I think that our experience of cases of long-standing muscular contraction in hysterical and other nerve diseases, shows that a muscle may, even after years of contraction, be structurally unaltered. Besides, it should not be forgotten that the contracted muscle in squint, owing to concomitancy, is far from remaining continually in the same state of contraction.

Graefe reasons as follows : The natural connection between accommodation and convergence is the one found in emmetropia. In the hypermetropic eye, the physiological education will, in most cases, succeed in overcoming the want of harmony between accommodation and convergence ; but in many cases squinting occurs during the struggle, and finally the muscle is anatomically shortened. Whether the struggle between binocular vision and excessive convergence lead to victory or defeat depends on the state of the muscle, and not on the presence or absence of the ordinary favouring circumstances (anisometropia, etc.), because an anisometropic hypermetrope may retain binocular vision, and, on the other hand, a hypermotrope with equal and good vision in both eyes, may develop squint. But if the muscle is anatomically shortened, this decides the question.

This seems to me to be reasoning in a circle. If accommodative squint causes the anatomical shortening, we cannot understand why the latter does not occur in all cases in which a hypermetrope gives way to his tendency to squint. Why does the squint sometimes become permanent almost at once, and why, in other cases, is it periodic for a whole lifetime?

It is just this periodicity of the squint which troubles Graefe. He, however, comes out of the difficult position by saying: In point of fact, there is really always anatomical shortening in the case of a periodic squint. Sometimes you may demonstrate its existence in the moments of vacant stare (correct position) by means of a latent convergence occurring behind the occluding hand. But sometimes this is not found, the position behind the hand remaining perfectly correct; none the less, the shortening of the muscle, which ought to effect latent convergence is there; only, the latent convergence is masked by what Graefe calls "Convergenzgefühl," which is the same as my "consciousness of distance." This I consider impossible. This regulation of position is far too weak to contend successfully with an anatomically shortened muscle. I need not again give my reasons for not admitting adhesion to binocular vision as a general feature in periodic squint. Graefe seems to consider it the sole reason for the squint remaining periodic.

It matters not what name we give to passive muscular shortening—increased average contraction (v. Graefe); increased elastic tension (Schweigger); or whether we assume nutritive changes (increase of the interstitial connective tissue)—with several authors. None of these have been actually demonstrated. The essential point is that such conditions would not be found to accord with the fundamental laws of concomitant squint. One of these is: The angle of the primary squint is equal to that of the secondary. Another is: The arc of movement of the squinting eye may be transposed slightly in the direction of the deviation (it need not always be so transposed), but the limitation of movement in the direction opposite to that of the squint is always considerably less than the angle of the squint.

Now, an internus, the anatomical structural shortening of which has given rise to an inward squint of, say, 6 mm., must of necessity, when the impulse to innervation remains the same, cause a restriction of 6 mm. in the outward movement. The shortening of the muscle, degree of the squint, and limitation of movement must be all exactly equal in amount. It may readily be imagined, that the limitation of movement may be partially masked by an increase of innervation, as one sees in paresis, but the angle of the secondary squint would then be distinctly greater than that of the primary squint. We find, on the contrary, that when the squinting eye fixes an object lying to its outer side, the angle is rather less than the primary one. The assumption of an insufficiency of the antagonist would in a still higher degree demand an increase of the secondary squint. In deep narcosis, after death, in deep sleep (Stellwag, Raehlmann), a convergent (permanent) squint may disappear. This would be impossible, were the shortening due to structural change.

Convergent squint is now and again found to disappear in the course of time. There would, therefore, have to be a change going on, which was exactly the opposite of that giving rise to the shortening.

The supposition, that this phenomenon is due to alteration in shape and position of the orbits, or change in the length of the muscles, is not very likely, and does not receive much support from what has been demonstrated so far (Emmert, Schneller).

My objections to the assumed anatomical shortening may be summed up then as follows :

(1) It has never been demonstrated anatomically.

(2) It is not in accordance with the fundamental laws of squinting.

(3) It is not in accordance with the temporary cessation of squint (narcosis, etc.).

(4) The spontaneous disappearance of squint renders it improbable.

In referring to the limitation of the outward movement in squint, I stated that it was occasionally altogether absent. However, as a rule, it is present in a greater

or less degree both in convergent and divergent squint.

But it need be neither a structural shortening nor an insufficiency of the antagonist which causes this limitation of movement, but simply want of practice. In both monolateral and alternating convergent squint, there will very seldom be any call for any great outward rotation of the squinting eye. This position being an unaccustomed one, is therefore assumed with difficulty. Experience shows, however, that the defect is in a measure latent and can be considerably overcome by practice. This could not be the case were it due to structural changes in the muscle. Even Schweigger admits, that want of practice plays a most important part in this respect.

In the full report of my lecture the theories of several other authors, especially Stilling, will be considered. Before concluding, I cannot deny myself the pleasure of quoting some remarks of two authors, who, in the main, seem to agree with me. Raehlmann says: The position of the eye in squint depends on a permanent innervation of the muscle, originating in the brain; and further: The permanent innervation, which during wakefulness produces squint, is not necessarily a voluntary innervation; on the contrary, it must be considered as unconscious and involuntary. The other author is Stellwag v. Carion: He considers that true strabismus convergens depends on an excess of convergence, acquired through habit and exercise, and effected by a conscious and arbitrary binocular innervation, which, however, may not be under the control of volition. Squinting is thus a purely functional anomaly, without, primarily at least, any change of the parts involved, and with undiminished power of movement.

There is in this definition a seeming contradiction between the expressions: "conscious and arbitrary" on one side, and "not under volitional control" (nicht mehr freiwillige) on the other; but on the whole, I think, he means the same as I do.

Stellwag denies expressly the possibility of material changes in the muscles, of abnormal muscular insertions, and of diminished or increased muscular resistance.

I am aware that I have no right to expect that all ophthalmologists should take the same interest in this subject as I have always done. My excuse in drawing attention to the subject should be this, that a theory of squinting depending on anything else than an anomaly of innervation, subverts all our traditional notions of the laws of associated movements.

A closer consideration will—as I believe—show, that our conception of squint must necessarily influence our treatment, but I cannot here enter upon this very intricate and interesting question.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, December 12th, 1889.

J. Hughlings Jackson, M.D., F.R.S., President, in the Chair.

Note on a Case of Hereditary Tendency to Cataract in Early Childhood.—Dr. Tatham Thompson (Cardiff) gave an account of well-marked heredity of cataract through four generations of the same family. The cataract developed when the individuals were from 3 to 5 years of age, and in all the cases except one both eyes were affected. There was at first a finely granular opacity of the entire lens, which rapidly increased in density till vision was reduced to mere light-perception. The lenses were much harder than those affected by the ordinary congenital or lamellar type of cataract. One peculiar feature was that the tendency was transmitted in two generations only through the male line, thus differing from the somewhat similar cases recorded by Mr. Berry in the Ophthalmic Review for January, 1888, but agreeing with the observations of Hosch and others. The heredity was more marked in the early child-bearing period ; this was also noted by Mr. Berry in his patients.

In reply to questions by the President, Mr. Rockliffe, Mr. Gunn, and Mr. S. J. Taylor, Dr. Thompson said that

his patients were in all other respects healthy, and there was no evidence of further disease of eyes. He was unable to obtain any information which explained the curious inheritance. There was no consanguinity in the parents of the affected children.

The Operative Treatment of Cicatricial Ectropion of the Lower Eyelid.—Mr. Tweedy described a method by which he had obtained very satisfactory results. He showed a patient upon whom he had operated, and a drawing of the same patient previous to operation. He made a doubly curved incision from the outer canthus, downwards and outwards over the malar prominence, and a second parallel incision about 6 to 8 millimètres to its inner side, carried through the whole thickness of the everted lid. The flap thus formed was dissected up, remaining attached only at the lower end. He then made a single straight incision obliquely across the cicatrix, nearly parallel to the lid margin ; the outer end of this reached to the innermost of the two curved incisions. The lid and adjoining skin above this linear incision were then separated from the subjacent tissues. This allowed the cut surfaces at the sides of the flap to be brought closely together and united by sutures, and the eversion of the lid was thus corrected. The gap left by the drawing up of the lower lid was filled by the flap previously made, which was turned inwards towards the nose, and secured in position by a few stitches.

Mr. Mackinlay asked if the depressed cicatrix so usual in these cases was filled up by this plan of operating. In the case shown there was still a rather deep depression.

Mr. Spencer Watson fully appreciated the ingenuity of Mr. Tweedy's method, but thought that for most cases a simpler operation would suffice.

Mr. Tweedy replied that the operation he had described was designed for the cure of the ectropion. In the particular case exhibited to the meeting there was a large osteophytic mass at the lower orbital margin, covered by a very thin cicatrix, and little could be done to remedy the depression at the site of the scar.

The Operative Treatment of Symblepharon.—Mr. Tweedy gave a description of a procedure which he had adopted in

cases of extensive symblepharon following burns. It was most suitable for those instances in which there was a prolongation of the cicatrix on to the cornea. His plan was to freely separate the lid from the cornea and globe, making a sulcus rather deeper than that of the normal conjunctiva ; then having attached two or three fine doubled silk threads to what had been the uppermost margin of the symblepharon, to pass these by means of curved needles through the lid from the bottom of the sulcus, bringing them out on the skin surface as near the lower orbital margin as possible. These threads were then tied over a piece of drainage tube, and allowed to remain in position for four or five days. By this means the cutaneous surface of the corneal portion of the symblepharon was folded inwards and became the lining membrane of the lid. The patient should be kept under observation during the process of repair, so that any adhesions which formed between the lid and the globe could be broken down. If the lower lid were much incurved by the folding of the flap, its position could be restored by buttonholing the flap near the margin of the lid.

Primary Tuberculosis of the Iris.—Dr. Hill Griffith (Manchester) gave an account and showed specimens and drawings of tubercle of iris, occurring in a 7 months old female child. The eye had been affected for one month, and the child subject for three months to attacks of bronchitis and diarrhœa ; there was an enlarged gland in the neck on the same side, but there were no other physical signs of tubercle. The parents were healthy, and there was no family history of phthisis. A yellowish nodule grew from the periphery of the iris of the right eye, and numerous millet-seed bodies from its surface ; the pupil was closed, but there was no acute inflammation. The nodule grew rapidly, and the smaller deposits multiplied day by day. The eye was enucleated after three weeks' unsuccessful treatment. The disease was found to be confined to the iris and ciliary body. The new growth exhibited the usual histological characters of tubercle ; but Professor Dreschfeld failed to detect the bacillus tuberculosis. Dr. Griffith said that in 32 recorded cases in which microscopic and other tests left no doubt as to the tubercular nature of the disease, one eye only was

affected in 29; the average age of the patients was 12, youngest 4 months, oldest 51 years. In 10 cases bacilli were searched for, but only found in 4; in one of the remaining 6 cases, however, the inoculation test was successful. Three cases in which no operation was undertaken terminated fatally from tuberculosis. Of the 27 cases in which enucleation was performed, 2 died with brain symptoms, but several others showed signs of tubercle subsequently to the operation. Dr. Griffith thought enucleation was on the whole satisfactory, patients being reported well five or more years afterwards. Iridectomy could not be recommended. In view of the fact that it was impossible to be quite certain if the disease were primary, and that some of the milder cases got well, he would enucleate only if the sight was destroyed or the eye becoming rapidly disorganised in spite of treatment, as in his own case.

Mr. Lawford mentioned two cases of supposed primary tubercle of the eyeball in young children. In both of these enucleation was performed, and the general condition of the patients improved markedly: one was known to be alive and well three years afterwards. In these and in many of the recorded cases there was strong heredity of tubercle. His own feeling was in favour of enucleating in cases of intraocular tubercle, as soon as there was moderate certainty that the eye was irremediably damaged; he thought the after-history of published cases justified this opinion; in a fair proportion the disease seemed to have been eradicated.

Mr. McHardy referred to a case of localised choroidal tubercle which he had brought before the Society last session, and in which he had removed the eyeball. The child was still in fair health, though delicate. In cases of tubercular disease of cornea, recovery sometimes occurred even when the affection was very severe. In localised choroidal tubercle, enucleation should, he thought, be performed; but in cases of tubercle of iris he was often doubtful what treatment to adopt.

Mr. Tweedy spoke of a young man who had been under his care at Moorfields for twelve or eighteen months, and in whom both irides were studded with little tubercular bodies. The eyes were slowly degenerating in spite of all treatment.

There was no family or personal history of tubercle or syphilis.

Dr. Tatham Thompson referred to a case of tuberculosis of the eye, in which enucleation was followed by tubercular meningitis and death.

Tealeaf Conjunctivitis.—Mr. Charles Wray (introduced) read a paper describing a form of conjunctivitis observed by him after the application of tealeaf poultices to the eyelids. In a typical case there was swelling and congestion of the lid margins, congestion of the palpebral and ocular conjunctiva, the latter being most affected in the line of the palpebral fissure. The caruncle and plica semilunaris were swollen, and presented a peculiar glistening, translucent appearance. There was sero-purulent discharge. Mr. Wray considered it most probable that the affection was caused by micro-organisms.

Living and Card Specimens.—Mr. Treacher Collins: Microscopic section of Human Lens with Epithelium on the inner surface of the Posterior Capsule, and showing other structural peculiarities.—Mr. Jessop: (1) Aniridia with Dislocation of Lenses; (2) Punctate Appearance of Anterior Capsule of Lens.—Mr. Silcock: A case of Symblepharon treated by Snellen's operation (modified).—Mr. Spencer Watson: Osteoma of infra-superciliary Region.

THE IRISH LICENSING BODIES AND OPHTHALMIC SURGERY.

By John B. Story,

Extern Examiner in Ophthalmic Surgery to the University of Dublin.

No time can be more fitting than the present wherein to treat of the position which the study of ophthalmic surgery occupies or should occupy in the education of the medical student, and I have chosen the relation of the Irish corporations to that study as the subject of this article, because, so far as I know, they have been the first to recognise the importance of ophthalmic surgery to the general practitioner, and it is not generally known that all the Irish medical corporations at present insist upon each candidate for their licences passing an examination in this branch of surgery, and attending besides at an ophthalmic hospital or ophthalmic department of a general hospital, where "clinical" instruction is given.

Ophthalmic surgery does not seem to have received much attention in the discussion that has been going on of late upon the gaps and defects in medical education. Proposals have been made to extend the curriculum to five years, as in most other civilised countries, to insist upon a period of apprenticeships, etc., but little or nothing has been written upon the importance of a sound knowledge of eye disease and its treatment, the want of which knowledge in general practitioners must be one of the most fertile sources of blindness to the population. This sound knowledge is of course far less in extent than that which is expected of a "specialist," but so far as it goes it is sound and is of a kind not to be nowadays

acquired, except at an ophthalmic clinique under the guidance of an ophthalmic specialist.

The first, in point of time, to recognise the necessity of ophthalmic instruction was the University of Dublin. So long ago as 1870, the University Calendar contained a paragraph to the effect that candidates for the M.Ch. degree (the B.Ch. was not in existence at that time) must attend a course at St. Mark's Ophthalmic Hospital, and the Calendar for 1873 records the name of Henry Wilson as the first University examiner in ophthalmic surgery. The 1875 Calendar informs students that a special examination in ophthalmic surgery would form a part of the B.Ch. examination. This examination consisted of a paper of five questions, each relating to a distinct subject, and was assigned 10 marks, the total marks of the examination being 100. No change took place in these regulations till last year, as will be noticed later on.

The Royal College of Surgeons was much later than Dublin University in recognising the importance of ophthalmic surgery, though it has the credit of being the first of our corporations to institute a clinical (practical) examination in the subject.

In March, 1879, a letter was sent from the General Medical Council to the College of Surgeons, enclosing a memorial from certain ophthalmic surgeons, as to compulsory attendance of students at lectures on ophthalmic surgery. In November of the same year a reply was sent, in which the council of the college concurred in the views of the memorial as regards the defect in professional education in the matter of ophthalmic surgery, and the great importance of remedying that defect. The council considered the course of study as suggested in the memorial, a fair and reasonable one, and would gladly require such a course of study for their diploma, if the other licensing bodies would join in demanding it; the only objection being the already over-crowded state of the curriculum.

The council, however, thought better of this decision during the succeeding winter, for on March 10th, 1880, they resolved that after January 1st, 1881, candidates for the Letters Testimonial be required to produce a certificate of attendance upon three months' course of clinical instruction in ophthalmic surgery. It is no secret that the success of this motion was altogether due to the exertions of its proposer, Mr. Swanzy.

Difficulties soon arose as to what certificates in ophthalmic surgery should be recognised. On April 1st, 1880, it was resolved that certificates should only be received from institutions having a special ward set apart for receipt only of ophthalmic cases, and having a special extern department for treatment of diseases of the eye; and on July 21st, 1881, that such institutions must have eight beds permanently for eye cases, and an extern department open for teaching students at least twice in the week.

The results of this compulsory attendance at an ophthalmic hospital were not found satisfactory, and the scheme was abandoned after the experiment of one year only. The over-burdened fourth year's student, "cramming" for his final examination, went through a mere form of attending the ophthalmic hospital, and took care not to load his mind with any knowledge that did not pay at the approaching examination. On December 8th, 1881, it was accordingly resolved to discontinue the compulsory attendance at an ophthalmic hospital, and to add to the final surgical examination a special examination, including clinical examination in ophthalmic surgery, and to appoint an extra special ophthalmic examiner to conduct the examination.

Ophthalmic surgery was very nearly excluded altogether when the Colleges of Surgeons and Physicians combined in 1886 to form a conjoint examining board —indeed at one time the draft scheme contained no regulations as to ophthalmic surgery whatsoever; but

owing to the persistent efforts of the only specialist at that time on the Council of the College of Surgeons the regulations which have ever since been in force were adopted. Candidates for the conjoint licence of the two Colleges must attend during three months at a recognised ophthalmic and aural hospital, or at a recognised ophthalmic and aural department of a general hospital, clinical lectures in ophthalmic and aural surgery. They must also be examined in these subjects at the final examination both on paper, *viva voce*, and clinically. The paper examination consists of five questions to answer, for which one hour's time is allowed. Fifteen minutes are given for the *viva voce* to each candidate. At the clinical examination each candidate gets two "external" cases and one ophthalmoscopic case, in order to ascertain if he can see the fundus; one case to test refraction qualitatively (*e.g.*, by Retinoscopy), and a few questions as to tension, visual acuity, &c. Seeing the disc is essential, as also to diagnose and treat simple external diseases. Ophthalmic surgery is not a separate pass subject, but occasionally candidates are passed in surgery and rejected in ophthalmic surgery, or rejected in the former and passed in the latter.

The regulations of the conjoint board of the College of Surgeons and College of Physicians have been followed also by the conjoint board of the College of Surgeons and the Apothecaries' Hall. Candidates for this licence must also attend a three months' course of clinical lectures at a recognised ophthalmic hospital, or recognised ophthalmic department of a general hospital, must pass a written examination and undergo fifteen minutes' *viva voce* in ophthalmic and aural surgery; but there is no clinical examination—a very important omission.

The regulations of the Royal University require a three months' course in a recognised hospital having at least ten beds devoted to diseases of the eye and ear,

and candidates for the surgical degree have to pass an examination in Ophthalmology and Otology, and exhibit reasonable proficiency in the use of the ophthalmoscope and laryngoscope. The examination is unfortunately not a clinical one. The examiner is a specialist, and he gives two questions in the surgical paper with the two examiners in general surgery, and he has the power of rejecting the candidate even if the other examiners wish to pass him. Candidates for honours receive a clinical examination including the use of the ophthalmoscope. The ordinary candidates are examined also *viva voce*. These regulations have been in force since the spring of 1888.

The combination of ophthalmic and aural surgery in the above regulations is a natural result of the custom universal in Ireland of specialists in the one branch being also specialists in the other, and although it has no real anatomical or other theoretical justification, it works very well in practice, and will probably continue to do so, as every ophthalmic hospital in Ireland is also an aural hospital, and in the earlier part of his practice, at any rate, the specialist will always have to devote about as much of his time to the one speciality as to the other.

The University of Dublin has lately made a new departure. At the last examination in the year 1889, the Court of Examiners permitted the extern examiner in Ophthalmic Surgery to change the written examination for a practical so-called clinical examination, and the candidates were required to examine cases of both external and internal diseases of the eye and show some acquaintance with the use of the ophthalmoscope and some knowledge of refraction and how to test visual acuity.

Nothing can be more surprising than the amount of ignorance of practical ophthalmology a student is capable of exhibiting, even when he has been sufficiently

coached up to answer questions very fairly when given a paper on the subject. Students presented themselves at this examination who would not have been rejected on the old system of a paper of five questions, but who by making such mistakes as the following were allowed even by the non-ophthalmic examiners to be properly rejected. A. diagnosed a case of ordinary senile cataract with active pupil as iritis with occluded pupil and pus! The same student failed to diagnose marginal blepharitis, or recognise a corneal leucoma, and could not qualitatively estimate refraction by retinoscopy. He could not tell whether the mirror of his own ophthalmoscope was plane or concave! B. failed to diagnose pustular conjunctivitis, and granular ophthalmia with pannus corneæ. He regarded an old adherent leucoma as a case of fresh iritis, and could not distinguish between an ulcer and a nebula corneæ. C. could not see a marked case of synechia anterior, regarded diffuse interstitial keratitis as hypopyon, and failed to see an obvious hypopyon in the eye of the next patient presented to him.

On one point the system of examination in Dublin University is very defective. A student, at the final examination at least, is passed or rejected by the vote of the whole court, and if passed must be passed in all the subjects of the examination. It comes about then that a candidate occasionally obtains a fairly high percentage of marks all round, but is shown to be almost absolutely ignorant of one of the special subjects of the examination. As no one examiner has a veto this candidate is most likely passed, as the court do not care to reject a man under such circumstances unless the subject in which he fails is regarded as of the highest importance. Ophthalmic surgery, it need hardly be said, is never so regarded by ordinary surgical examiners—very rarely may anatomy even attain this high position. As a result of this custom a man was passed for the late B.Ch. degree who exhibited the following

amazing acquaintance with the diseases of the eye. He was shown seven cases. 1. Granular ophthalmia and pannus he called marginal blepharitis, and there happened to be no marginal blepharitis in that particular case. 2. Marked pustular conjunctivitis he diagnosed as ulcers. 3. He failed to see the disc in a normal eye. 4. He failed to see anything ophthalmoscopically wrong in a marked case of detached retina. 5. Senile cataract with active pupil he diagnosed as iritis! 6. $V = \frac{6}{18}$ he stated to be normal. 7. He failed to distinguish hypermetropia from myopia by retinoscopy.

If a student does well in all subjects but one it should be possible to send him back to his studies for such time as would be necessary for him to make up that subject, and then allow him to present himself for re-examination in that subject alone. If a student is to be examined in any particular subject, he should not be passed till he has shown sufficient mastery of it.

In conclusion, I desire to thank my friends Mr. Swanzy and Mr. Benson for the information they have given me about the examination in the Royal University and the College of Surgeons, and to lay down the following propositions, to which I believe the readers of the OPHTHALMIC REVIEW will unanimously assent.

1. Each candidate for a licence to practise medicine and surgery should be compelled to attend an ophthalmic clinique for a period of three months.

2. The final examination should include as a separate pass subject a clinical examination by an ophthalmic specialist.

3. The passing standard should be that amount of knowledge which an average student could obtain by spending one hour a day during three months at an ophthalmic clinique.

RETINAL ILLUMINATION FOR THE SHADOW-TEST.

By Edward Jackson, M.D.,

Professor of Diseases of the Eye, in the Philadelphia Polyclinic.

Rays coming from a luminous point in the retina of a myopic eye, or an eye made to imitate myopia by placing before it a convex lens, meet in front of the eye at the focus conjugate to the position of the retina. This conjugate focus of the retina is what we seek to locate by the shadow-test. Between it and the eye we can see the retina in the erect image, beyond it in the inverted image. For this reason I have called this point the point of reversal. The surgeon locates it either by measuring its distance from the eye (plane mirror), or by changing glasses until the one is found that brings it to a certain desired distance, as one metre (plane or concave mirror). In either case the eye of the surgeon is made to approach, or coincide with the point of reversal of the eye under observation, and the accuracy of the results obtained depends on the exactness of this approximation or coincidence.

As we approach closely the point of reversal the movement of light and shade in the pupil becomes more rapid, the apparent boundary separating light and shade broader and more indefinite; and the illumination of the light area more feeble. This is because near the point of reversal an extremely small part of the retina comes to occupy with its image the whole area of the pupil. This can be better appreciated after making a black dot on white paper, and viewing it through a strong convex lens, holding the dot and lens in such positions that the focus conjugate to the position of the dot shall fall in or near the observing eye.

Again, in regular astigmatism the appearances of the light area in the pupil become typical just in proportion as the area of illuminated retina is reduced to a single point; and grow less and less characteristic as the area of retinal illumination is enlarged. Then, too, all eyes present perceptible irregular astigmatism or aberration. The refraction in one portion of the dilated pupil differs from the refraction in another portion. In one part of the pupil the reversal of movement occurs sooner than in another. If the area of illuminated retina be small enough, the different movements in different parts of the pupil are distinguishable, and will not be confused one with another; and the movement in the part of the pupil that it is of especial importance to study, usually the centre, will not be confounded with the movement of some other part.

To attain the highest degree of accuracy with the shadow-test, it is therefore essential, so far as practicable:

To have the area of retinal illumination as bright as possible;

To have it as small as possible;

To secure to it the most definite boundary, the sharpest, most sudden transition from light to shade.

To ensure conformity to these conditions of accuracy, we must attend to the brilliancy of the source of light, its size, outline and position.

The electric arc light is in most respects an ideal light for retinoscopy; but because only lights of such high candle-power that they could not be used within the limits of an ordinary consulting room are at all steady, or certain in their performance, it is impracticable to use it without shading it so as to do away with its special advantages. The incandescent electric light does very nicely for the measurement of simple myopia or hyperopia; but its shape quite unfits it for the detection of astigmatism.

Among flame lights, the animal fats, wax, paraffin,

and the less volatile of the mineral oils, furnish more brilliant flames than illuminating gas. But the best light is had by doubling the flame, as in the Argand gas burner, the "student-lamp," or the "duplex" burner for oil lamps.

The size of the primary source of light may be fixed by using a small flame, as that from a night-lamp, or a taper with a small wick; or by removing a large flame to a considerable distance, or by covering a large flame with an opaque chimney, with a small aperture for the emission of light. The immediate source of light for retinoscopy is, of course, an image of the primary source; for the plane mirror a virtual image, as far behind the mirror as the primary source is in front of it; for the concave a real image at the focus of the mirror, conjugate to the position of the primary source. It is curious that, so far as I know, no advocate of the use of the concave mirror for retinoscopy has pointed out what is really its most important advantage, viz: that, with the ordinary lamp flame placed back of the patient's head, using it at a distance of a metre or more, with the focus mostly employed, it gives a smaller immediate source of light, which is also situated closer to the observer's eye than is obtained with the plane mirror.

To get the sharpest contrast between light and shade, the source of light must have a sharp boundary; and the rays from it must be focussed upon the retina. The margin of any flame is somewhat nebulous, there is a somewhat gradual transition from light to darkness. On this account it is better to have recourse to the opaque metal chimney, which shuts off this nebulous margin and gives a sharp boundary to the source of light. Then if the opening through which the light proceeds is made circular, its shape is more favourable than that of a flame for the detection of astigmatism. Such an arrangement is also preferable to the use of a small flame on account of superior steadiness.

The light entering the eye can only be perfectly focussed on the retina when its immediate source is situated at the point of reversal. For the concave mirror, when the observer's eye is at the point of reversal, the immediate source of light must lie at the focus of the mirror, and its position cannot profitably be varied by changing that of the primary source, from its ordinary position, a little back of the patient's head. With the plane mirror, however, the closer the primary source of light is brought to the mirror the more nearly does its virtual image, the immediate source, coincide with the position of the observer's eye; so that they may be made to approach or reach the point of reversal together.

If the lamp-flame be quite concealed from the patient by a metal chimney, it cannot in the least interfere with the test to place it between the patient and the surgeon; and if an ordinary or a universal swinging gas bracket be employed, it gives sufficient mobility of the light for all practical purposes.

While it would, on account of facts mentioned above, be desirable to have the source of light reduced to a single point, this is not practicable, because: first, a single point, unless it be of the electric arc, will not give us as much light as we require. Second, if the source of light be smaller than the sight-hole of the mirror, it will disappear in it every time the mirror is rotated, causing great annoyance and uncertainty. Indeed, when the source of light is made small, it is more satisfactory to use a mirror which has simply had only the silvering removed, rather than one with a hole cut in the glass, as the reflection from the glass alone is a decided help, when as at the point of reversal we are compelled to reflect the light into the observed eye from this part of the mirror. It is this matter of the sight-hole that really limits the exactness possible with the shadow-test. The size of aperture for the source of light which has proved most satisfactoy to the writer, is a circle

eight or ten millimetres in diameter, to be cut from the metal chimney at such height as to come opposite the brightest part of the flame. The sight-hole in the mirror is three or four mm. in diameter.

THOMALLA (Friedland). On the Colouration of the Diseased Cornea as a means of Diagnosis. *Centralblatt f. prakt. Augenheilkunde, Nov.*, 1889, *p.* 322.

Following up the observation of Straub, that the cornea when deprived of its epithelium is coloured green by a concentrated alkaline solution of fluorescine, the author made a series of experiments as to the diagnostic value of this action. Of three varieties of fluorescine, one made by Gruebler, which in substance presents a bright red colour, appeared to give the best results. A solution containing 2 per cent. of this and 3·5 per cent. of carbonate of soda was employed. It caused no pain. The results obtained were as follows :—

The healthy uninjured cornea is never coloured by the solution. Old opacities of the cornea and wounds which are perfectly cicatrised are never stained.

Where any epithelial defect exists, the subjacent cornea becomes coloured green. In a case of lime-burn in which the epithelial covering was not destroyed, but remained loosely adherent, the subjacent cornea was deeply coloured while the epithelium showed no colouration.

Corneal ulcers are coloured by the solution until they are completely healed and all signs of irritability have disappeared.

Colouration takes place around a foreign body seated on the cornea, the foreign body itself appearing as a black point in the centre of the green area ; after its removal this point also assumes a green colour. If, some days after the complete removal of the foreign body, the colouration is still producible, an unhealed ulcer remains.

Perforating wounds of the cornea permit, in like manner, a colouration beginning at the lips of the wound

and extending thence into the healthy part ; this colouration is producible until the wound is completely cicatrised and all inflammatory symptoms have subsided.

Keratitis of all kinds, whether ulcerative, fascicular, or interstitial, causes the cornea to assume a green colour in the diseased part, under the action of the fluorescine solution. This is especially the case in presence of infiltration into the substance of the cornea ; also in presence of pannus, whether due to trachoma or to phlyctenular inflammation.

In serous iritis, when the deposit on the posterior surface of the cornea is accompanied by changes in the epithelium, the affected area is readily coloured.

In acute glaucoma some portion of the cornea is always coloured, and this was noticed in one instance while the symptoms were still only premonitory. In some cases of chronic glaucoma some colouration was produced, but in the majority there was none.

In the majority of conjunctival diseases, even the long-continued use of concentrated solutions produces no colouration ; phlyctenular conjunctivitis is the only exception ; in this condition a slight yellowish-brown colouration is produced.

With regard to the mode in which the colouration occurs, observation both on the living eye and under the microscope showed that while the connective tissue of the eye is readily coloured, the epithelium remains entirely uncoloured. Healthy epithelium is impermeable by the fluid. The staining of the cornea which occurs in non-ulcerative keratitis is due to the fact that the corneal epithelium shares in the morbid process, and though not destroyed loses the power of resisting the entrance of fluid. The colouration of the cornea in acute glaucoma doubtless depends in like manner upon some disturbance of the nutrion of the corneal epithelium.

The various conditions in which fluorescine may be used as an aid to diagnosis are obvious from the foregoing account of its action.

P. S.

TROUSSEAU (Paris). Lupus and Ocular Tuberculosis. *Arch. d'Opthal, November-December*, 1889.

This paper is a record of some experimental inoculations of rabbits with material obtained from two cases of lupus of the conjunctiva, and is of considerable interest, as adding to the already numerous observations upon the intimate relationship between lupus and tubercle.

The first inoculations were made upon two rabbits, the source of the material being a young woman aged 21, who had been for several years the subject of lupus of the nose and cheeks, and who became a patient at the Quinze-Vingts Clinique in consequence of extensive lupus of the conjunctiva. A small portion of the diseased tissue was introduced into the anterior chamber of a healthy rabbit through a sclero-corneal incision, care being taken to avoid touching the iris. No reaction followed ; the nodule gradually became smaller, and by the eighth day had entirely disappeared. No change was noticed till twelve days later, when the iris became swollen, and small white dots appeared on its surface. These rapidly increased in size and became confluent, forming a nodule the size of a small pea, around the base of which were numerous small tubercles. Eventually the whole chamber was filled by growth of a yellowish colour. The health of the animal appeared unaffected.

On rabbit No. 2 the inoculation was made in the layers of the cornea, without opening the anterior chamber. The nodule was absorbed by the eighth or tenth day. A fortnight later two or three small grey points appeared in the cornea ; these grew and formed a yellowish vascular nodule which protruded the corneal layers, but did not perforate. Growth proceeded for about two months, and was followed by gradual diminution in size, till, three months later, the only trace remaining was a small staphyloma. The rabbit appeared perfectly well in other respects.

Two other rabbits were inoculated from another patient also suffering from lupus of the conjunctiva. In the first of these two the results were analogous to those in rabbit

number one, the inoculation having been done in precisely the same way. The second rabbit was inoculated in the cornea ; the nodule of lupoid tissue became absorbed, and in its place appeared several small greyish spots, which remained about the same size for two-and-a-half months ; this animal was accidentally killed, and the eye was lost.

The author points out that in these experiments, after complete absorption of the inoculated material, development of tubercle occurred, in the tissues which were so changed by inoculation, as to become a suitable soil for the growth of bacilli.

The bacillus of Koch was found in large numbers in the lupus nodules taken from the conjunctiva of the two patients. It is not stated that the rabbits' eyes were examined microscopically.

It is noteworthy that in Trousseau's experiments, as in those of several other observers, who believe in the identity of tubercle and lupus, general tuberculosis did not occur in the animals inoculated ; whereas it nearly always results in cases in which inoculation is made from what is clinically called tubercle. Trousseau replies to this argument against the identity of the two diseases, that it is a well-known fact that there are numerous instances of curable tuberculoses ; and that the gravity of the affection varies very much according to the tissue in which it has its seat. He considers cutaneous tubercle (or lupus) as one of the most benign forms.

In the eye the cornea is apparently a much less favourable soil for the growth of the tubercle bacillus than is the vascular iris, bathed with aqueous ; and the author is of opinion that in man, tubercular disease of conjunctiva or cornea is much less a source of danger to the patient than intra-ocular tubercle. General infection is more likely to result from a tubercular growth in the iris than from a similar affection of the cornea.

J. B. L.

OTTO SCHIRMER. (Göttingen). Pathology of Zonulan Cataract. *V. Græfe's Archiv. XXXV.*, pt. iii., p. 147.

The papers of Beselin and Lawford (*vide* O. R., vol. viii., p. 13) have shaken Horner's classical theory as to the formation of zonular cataract. Both Lawford and Beselin found changes in the nuclear portion of lenses with zonular cataracts, and the latter goes so far as to assert that the cataract is due to an abnormal shrinking of the nucleus which itself is caused by some chemical alteration in the nuclear tissue. This theory differs from Horner's in assuming that the noxious agent affects the whole lens equally (not merely the growing layers), and that the zone of opacity is brought about by a subsequent shrinkage of the affected area, not immediately by defects in the layer of fibres laid down during the action of the noxious agent.

Against this view of Beselin's must be cited Deutschmann's observation of a zonular cataract with a microscopically normal nucleus.

Schirmer publishes four cases of zonular cataracts extracted at Leber's clinique, one case found in an eye enucleated for secondary glaucoma, and one produced experimentally in a rabbit.

CASE I.—A boy of ten, with double zonular cataracts. Extraction of left cataract some six weeks after discission, the anterior capsule being removed by Förster's forceps. The opaque zone was found to consist of numerous very small round bodies probably being lacunæ or vacuoles between the two fibres, as their position corresponded to this hypothesis, and as needle preparations failed to exhibit any distinct drop within a fibre. These vacuoles were filled with an apparently homogeneous mass, which appeared granular under a high power. The lens fibres were preserved in the cataractous zone, but were bent and irregular in their course. Their borders were irregular, and jagged, and their contents finely granular. No large myelin drops visible. The nuclei in this zone exhibited the signs of nuclear death, but perfectly normal nuclei were present here also.

The cataractous zone was sharply defined externally against the relatively normal cortical layers. Internally its vacuoles were not so perfectly sharply divided from the nucleus, and the nucleus itself exhibited similar vacuoles, large and few in the centre, numerous and small as they approached the zone of cataract. They formed a regular symmetrical layer at the posterior pole internal to the cataractous zone. The few lacunæ in the cortical layers may have been partly due to cataract *intra vitam*, but were mostly caused either by the discission or by the extraction operation.

CASES II. and III.—A boy of 14. Double zonular cataract in each eye, with anterior polar cataracts springing from external zones, and extending in front of the lens capsules. The lenses shrunken, and zonular fibres visible in colobomata, made by iridectomies downwards and inwards. Both lenses were extracted, Förster's forceps being used on the pyramidal cataracts, and exhibited the following appearances :—Macroscopically clear nuclei, and two separate distinct zones of cataract, the capsular cataracts adhering to the outer opaque zones ; but microscopically the nuclei and the intermediate transparent zones were seen to exhibit numerous vacuoles, similar to those occupying the cataractous zones. A third cataractous zone could be seen in the nucleus itself. The size of the vacuoles varied considerably, and their position was between the lens fibres wherever their position could be ascertained. Larger clefts in both lenses were probably caused by the operation of extraction. The iridectomies done in this case were made six and seven years before the extractions. At this early period only single cataractous zones were present. The second zone formed in the intervals between the eighth and fourteenth years of life. The adhesion of the pyramidal cataracts to the outer lamellar cataracts was caused, as in Leber's experiment, by the newly-formed fibres being unable to insert themselves between the capsules and the cataractous zones.

CASE IV.—A man of 33. Zonular cataract and some striæ in cortex, lens shrunken, extraction. The cataractous zone consisted of elongated vacuoles filled with a granular material, these lying between the lens fibres, and many very

small bodies of similar contents and in similar position. Hæmatoxylin stained the adjacent lens fibres and these granular spaces, the former rapidly, the latter only after long soaking,—a peculiarity for which Schirmer can offer no certain explanation. The nucleus resembled the former ones.

The cataractous zones in these lenses are the zones of small vacuoles lying around the nuclei, and the author thinks that Beselin and Lawford are in error in attributing the opacity to the large clefts seen by them in these specimens. The true cataracts in their cases are, he believes, the zones of small vacuoles immediately surrounding the nuclei, similar except in number to the vacuoles seen in the nuclei themselves. The other published cases of zonular cataracts exhibited similar appearances. Deutschmann found vacuoles and myelin bodies as the characteristic of the cataractous zones. (He indeed found these in the lens fibres as well as between them.)

Even in Beselin's and Lawford's cases the same layers of vacuoles were present, and are all shown in the plates, though these authors do not attach the same importance to them, and place them internal to what they regard as the cataractous zones. Schirmer believes that careful microscopic observation would have demonstrated that they were the cataractous zones, as this was easily seen in all his own cases. Such a band of vacuoles is just the very thing to produce an opacity in a lens, as the co-efficient of refraction differs in the vacuoles and the lens fibres ; and the fact that this layer was not sharply differentiated from the nuclei is no argument against his position, for there is nothing to prove that zonular cataracts have any such sharp line of demarcation. No other anatomical appearance has been seen to account for the opacity, except, indeed, the large clefts seen by Lawford and Beselin, and their form was not such as could produce a typical zonular cataract, and they have not been seen by others. Schirmer's observations fully corroborate those of Beselin and Lawford as to the appearances seen in the nuclei, and he agrees with these authors in identifying the nuclear changes with those seen in the zone, which he regards as the opaque portion of the lens. He holds that Beselin is wrong in regarding them as *post-*

mortem appearances, and that Lawford's view of chemical change in the nucleus is equally untenable.

Case V.—A woman aged 27, of strumous diathesis, and a history of ocular inflammation, ulcerative keratitis, ending in partial staphyloma and high tension. Iridectomy effected no permanent improvement, and the globe was finally enucleated, being staphylomatous, with anterior and posterior synechiæ, and a cataract. The lens was found to exhibit an anterior polar capsular cataract, a zone of transparent tissue beneath the capsule, a second slightly opaque zone, and then a sharply marked oval opaque zone exactly like a zonular cataract enclosing a clear nucleus. Microscopically these opaque zones resembled precisely the opaque zones in the other zonular cataracts, and Schirmer regards the case as one of acquired zonular cataract (unilateral), produced by purely intra-ocular causes. Græfe has described a zonular cataract caused by iritis with synechiæ, and Becker one resulting from perforating ulcer. Schirmer also has seen another one produced by this latter affection ; he adds, too, the account of an experiment upon a rabbit's lens. A small incision in the capsule produced a completely opaque cataract in a few days, but the opacity gradually lessened, and new transparent lens substance formed externally, the opaque part shrinking and clearing up in its centre, until, when the animal was killed a year later, a regular zonular cataract was the condition present, and the opaque zone was formed by the same collection of vacuoles as in the former cases.

Schirmer's observations lead him to adopt a slight modification of Horner's theory as to the formation of zonular cataract. The process is as follows :—Some unknown disturbance—probably in its nutrition—affects the lens so as to produce vacuoles in its substance. These may be at first in the fibres perhaps, but later on between them certainly. Only the newest lens fibres, and those formed during the action of the noxious agent, contain enough vacuoles to exhibit a visible opacity. The vacuoles in the nucleus are not enough to produce this appearance ; but though the nucleus remains transparent, it has altered in its physical properties, so that it shrinks more rapidly than the subsequently formed cortical portion is able to do, and these

clefts are found in the lens (as described by Lawford and Beselin); but these clefts are very probably the striæ (Reiterchen) which are so frequently seen in the periphery of zonular cataracts. Lastly, the lenses are generally small, as, even if the growth of new fibres can (which is doubtful) take place at the same rate as in normal lenses, the rapid shrinking of the nucleus produces a diminution in the total size of the lens.

J. B. S.

A. E. Prince (Jacksonville, Ill.). Evisceration. *Journal of the American Medical Association, Oct. 12th*, 1889, *p.* 516.

Prince found in his early experience with evisceration that, as compared with enucleation, the pain was more prolonged and severe, and was peculiar in character; and that healing was also more protracted. The pain he thought due to the effects of tension, pressure and inflammatory irritation on the long ciliary nerves left exposed by the operation, as they run forward in grooves on the concave surface of the sclera. He, therefore, was led, at the completion of the operation, to cauterize the whole interior of the sclera with pure carbolic acid. The use of carbolic acid in this way seems indicated both for its antiseptic and its anæsthetic powers. It closes the tissues subjected to it against the admission of micro-organisms; and it destroys the power of the sensory nerves of the part to give rise to pain.

In using the artificial vitreous spheres, Prince found the results at first very satisfactory. But later, in five out of six cases, there was absorption of the tissues along the line of union, followed by the expulsion of the glass sphere, and the contraction of the cavity as it filled with granulations. Even when this occurred the ultimate result appeared to be a better stump than was obtained without the use of something to replace the vitreous; and since giving up the use of the glass spheres, he had practised packing into the scleral cavity, loosely, to permit free drainage, powdered iodoform

After some weeks the mass of iodoform is expelled as was the artificial vitreous; but there seemed to be the same gain in the final stump. In none of the cases packed with iodoform was there subsequent suppuration.

E. J.

H. Knapp. A Case of Lenticonus Posterior. *Arch. of Ophthal.*, *XVIII.* 4.

Knapp records in this paper the fourth published case of this rare condition of the crystalline lens. The three previous instances were recorded by (1) Webster, (2) Van der Laan and Placido, and (3) F. Meyer, in the years 1875, 1880, and 1888 respectively. The two first were in adult males, æt. 24 and 33, the third in a boy of 10. Knapp's patient was a girl, 8 years old, who was brought to him in October, 1889, on account of pains in the eyes at school. The child's mother was "very near sighted," the father had divergent strabismus. The child's *left* eye was in all respects normal; when looking attentively at an object, there was binocular fixation, but the *right* eye soon diverged three or four mm. No diplopia. With a dilated pupil the right eye counted fingers at 12 feet, with $-\frac{1}{12}$ $V = \frac{20}{200}$. The inverted image of the fundus of this eye appeared quite healthy, but metamorphopsia at the optic disc and yellow spot was very marked. With a plane mirror a sharply defined red disc, apparently four mm. in diameter, and surrounded by black shadows, was evident in the centre of the red pupil. It resembled an oil globule on water. The corneal reflex was slightly below the centre of this disc when the patient looked straight forward. With the plane mirror, at some distance from the eye, two images of blood-vessels were seen, one set outside the central disc moving with the observer's head, and a second, inside the central disc, moving in the opposite direction. Examination of the retinoscopic shadows with a plane mirror showed distinct shadows on the inner borders of the central disc, which moved against the mirror. No lenticular opacity was visible by transmitted light or focal illumination.

The author remarks on the fact that only three cases of lenticonus posterior have been recorded during the past fifteen years, and seems inclined to think that the condition is not really so uncommon as these numbers suggest, but that it is probably overlooked.

J. B. L.

CORRESPONDENCE.

To the Editor of THE OPHTHALMIC REVIEW.

SIR,—May I be allowed a few words with reference to your remarks on the notice of Kryoukoff's glaucoma statistics which appeared in the last number of the REVIEW?

As you have not made it clear that these remarks have reference to my imperfect abstract, and not to the original, I think it right to say in justice to M. Kryoukoff that he expressly states all his cases to have been cases of *primary* glaucoma. The ages given were those of the patients when seen, but it is expressly stated of some how long the disease had lasted, and of others it follows that they had existed for some time previously, from the fact that the disease was absolute when first seen.

The inaccuracies are therefore mine. I have in my own mind always so entirely dissociated primary from secondary glaucoma, that I have always understood by glaucoma, primary glaucoma. But as this distinction is not always made in this country, it is obviously important to make use of the expression primary glaucoma when this specific disease is referred to.

G. A. BERRY.

December 30th, 1890.

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OBSTRUCTED RETINAL CIRCULATION.

By A. Stanford Morton, M.B., F.R.C.S.

Surgeon to the South London Ophthalmic Hospital and Ophthalmic Surgeon to the Great Northern Central Hospital.

Cases of obstructed retinal circulation are always particularly interesting, not only by reason of their ophthalmoscopic appearances, but especially on account of the difficulty frequently experienced in determining the cause of the obstruction and in deciding between embolism or thrombosis in any given case. In the first of the following cases there had been *repeated paroxysmal failure of sight* in one eye accompanied by *migraine*. After the loss of sight in this eye, during one of these attacks, the paroxysmal failure began in the other eye. There was no valvular heart disease.

In the second case there had also been previous paroxysmal partial failure of vision in the affected eye before the sight was irrevocably lost.

The urine was of low specific gravity and albuminous. The heart was hypertrophied, with aortic regurgitation, and there was high arterial tension and probable atheromatous degeneration of aorta.

In the third case there was no history of previous failure of sight. The urine was not albuminous, and, though the heart was slightly hypertrophied, there was no valvular murmur ; but there was high arterial tension and probable atheromatous degeneration of aorta.

Ophth. Review, Vol. IX. No. 3. March, 1890.

Case I.—Mercy C., æt. 22, came to me at the South London Ophthalmic Hospital on Jan. 14, 1884, with the following history: On the previous morning, after suffering from pain over the right brow, she perceived a dimness coming over her sight. On covering the left eye she found that she could not see in the *upper half* of the right field, and within five minutes the vision was completely lost in that eye. During the previous two years she had been subject to these attacks of failure of vision in the right eye, lasting some ten minutes, and was not alarmed until she found that the sight did not return as formerly. The ophthalmoscope showed all the usual appearances of obstructed retinal circulation, though, even within thirty hours of the blocking, the arteries could be made to pulsate by firm pressure.

She stated that during these attacks she first suffered from pain in the right temple and brow for three or four hours. The sight of the right eye would then begin to fail and be completely lost within three minutes of its first defect, the total failure lasting, as already stated, some ten minutes. Occasionally the upper half only of the field was obscured. During all this period she felt cold and sometimes giddy, but never faint. Sometimes there was also sickness.

On January 16th she had pain over the left brow, but there were no visible fundus changes, and the field and V. were normal.

February 19th. Patient had pain over the left brow, and the sight then failed from above downwards until it was completely lost for about a minute and a half, and then returned *from below upwards*. When I saw her later in the day the V. was J.1 and $\frac{20}{20}$.

I still see this patient periodically, and she says that though she has had occasional obscurations in the left eye, with zigzags and coloured stars visible at times, yet the attacks of these and the headaches are much less troublesome than they were.

Dr. John Abercrombie, under whose care this patient had previously been for palpitation, kindly examined her for me, and reported: "Cardiac impulse not displaced, area of dulness not increased, action regular. First sound prolonged,

chiefly at apex, but *no murmur*, even after hurried breathing. Second sound unduly clear everywhere ; *bruit de diable* in the neck (right side). Urine normal."

She never had rheumatic fever, but sometimes has rheumatism in elbows, knees, etc. Four years previously she is said to have had St. Vitus's dance for three months.

The two following cases came to Moorfields, under the care of Mr. Tay, to whose kindness I am indebted for permission to publish them :—

Case II.—William Dutton, æt. 44, came to the Hospital on January 17th, 1889, saying that when he awoke on the morning of the 15th the gaslight seemed to him "blue and blurred." This appearance he found was due to defect of his left eye. During the day the sight became clear. On the morning of the 16th the blurring was more marked, but did not trouble him during the day. On the morning of the 17th the blurring was much increased: all objects, according to his description, appeared as if he were looking at a pattern on ground glass ; and later on, at the time of his visit, the field appeared black, except a small part, where he could just discern large objects.

Ophthalmoscopic examination of the left eye showed a very faint haze round the macula, and some scarcely perceptible radiating streakiness of the retina round the O.D. There was also a soft-looking white mass, partly under and partly obscuring one of the retinal vessels, some way from the disc. On the 21st the fundus presented all the usual appearances of embolism, or thrombosis of the retinal vessels, with the "cherry spot" at the macula, and much œdema round it and the O.D. No pulsation or emptying of the vessels could be produced by firm pressure on the globe.

An examination of the urine at this time showed specific gravity 1012, with a trace of albumen.

The patient stated that he had generally had good health, but was always constipated. Twenty-three years previously he had inflammation of the kidneys, passing blood with his water (? calculus), and he had dropsy after fever when a child. One point worthy of notice is that he was always liable to frontal and occipital headache (without sickness),

and this was almost always present on rising in the morning; but he particularly remarked that it was entirely absent on and after the first morning, on which his sight was affected. He only attended a few times, but the œdema rapidly subsided, leaving the retinal vessels much diminished and partly obliterated.

Dr. James Anderson kindly examined this patient for me, and reported as follows:—

"*Kidneys.*—The albuminous urine of specific gravity 1010 and the high arterial tension indicate them to be granular. The urine contained large granular nucleated pus cells and a few granular and hyaline casts.

"*Heart.*—Considerable hypertrophy of left ventricle and fairly marked aortic regurgitation. The aorta is probably atheromatous.

Marked exaggeration of both knee jerks, and well-marked left-ankle clonus, but no gross alteration of motion or sensation. There is nothing pointing to syphilis."

Case III.—Chas. C., aet. 71. This patient, thinking that something was wrong with his sight, covered his left eye and found the right eye very defective, so that at the time of his visit on the same morning he was unable to count fingers with it.

On opthalmoscopic examination of the right eye there was found great œdema of retina with the "cherry spot" at macula. The arteries on the disc were very small, and the veins somewhat distended. There was also a large hæmorrhage in the effusion to the nasal side of the macula.

In the left eye the V. was barely $\frac{20}{40}$, and there was some swelling of the O. D. with distended veins, but fairly normal arteries, with the exception of one on the disc, which presented one or two fusiform dilatations. In the retina were a few greyish soft-looking masses of effusion with one small hæmorrhage. Both in the vitreous and retina were numerous masses of cholesterine.

This patient had never been subject to headache, and his bowels were always regular.

Dr. Anderson reports that he has "slight cardiac hypertrophy, with a slapping, accentuated aortic sound and

high arterial tension. There is no valvular murmur. He has almost certainly an atheromatous aorta.

Urine 1023, acescent, no albumen or sugar."

From the history of the above cases it will be seen that in No. 1 there was no accompanying valvular heart disease, in which essential point it differs from the interesting and instructive group of cases recorded by Nettleship in the British Medical Journal of June 14, 1879. Nor was there any discoverable source of reflex irritation such as that to which attention was drawn by Priestley Smith in the Oph. Rev., vol. III. Except in being a little anæmic, the patient appeared healthy, though there were vague rheumatic pains and a previous history of chorea. From the detailed symptoms which the patient gave it appeared evident that she suffered from migraine, and that during the attacks there was interruption of the retinal circulation as evidenced by the failure of sight advancing *from above downwards.*

This, as Priestley Smith points out in the paper just referred to, indicates some vascular disturbance in the retina itself, and is very different from the lateral ocular spectra generally associated with migraine and which may be referred to vascular disturbance in certain areas of the brain. It seems quite possible, however, that though in most cases of sick headache the vascular changes affect the cerebral areas, yet in some instances they may be ocular, or perhaps the two may be combined. Some patients say that their ocular symptoms are confined to one side. Possibly this may be explained by the fact of their having one retina locally affected, whereas those who refer the spectra to both eyes have a central vascular disturbance.

The coldness of the surface so frequently complained of in migraine and mentioned by this patient points to arterial constriction, and it is probable that the same condition occurred here in the retinal artery long enough for the formation of a permanent thrombosis.

Dr. A. Haig has recently shown that high arterial tension exists with migraine, and it seems only fair to assume that in Case I. the retinal thrombosis was associated with that condition. This factor then forms a connecting link between the first and two following cases, in which high arterial tension was specially noted as being present. If in a healthy young adult without any valvular heart disease, the occasional presence of this condition can produce thrombosis, it is not surprising that the same result should occur where, with increased arterial tension constantly present, there is also some aortic regurgitation and atheroma of the aorta, as in Case II. In Case III. there was no history of repeated paroxysmal failure, and possibly the obstruction may not have been thrombotic. With the history, however, of Case II. before us, it is allowable to suppose that there may have been, here also, partial, unobserved failures before the loss of sight, which, when discovered, was complete and permanent. As there was neither albumen nor sugar in the urine the ophthalmoscopic changes above noted may be attributed to the vascular condition. It would be well, therefore, as an aid in the diagnosis of the cause and in the treatment of obstruction of the retinal vessels, if the state of the arterial tension were more systematically examined than appears to have been generally done in such cases.

Carl Hess (Prague) on the Colour-Sense in Indirect Vision. *Von Graefe's Archives, Vol. XXXV., Part 4, p. 1.*

The colour-sense of the periphery of the retina has been minutely studied by many observers, but, through a want of uniformity in the methods employed, it has been impossible to accurately compare the various results obtained. Under the guidance of Professor Hering in the Physiological Laboratory at Prague, Hess has thoroughly investigated this interesting subject once more. The methods employed are fully described in his paper, and can be repeated by anyone who desires to test his results. The results appear to favour Hering's theory; but, whether this be admitted or not, they are an important addition to our knowledge of the subject. It is impossible to do justice to the paper in a short abstract; we shall attempt, however, to indicate the lines of the inquiry, the methods employed, and the chief results obtained.

Grouping of colours according to their appearance in indirect vision.—Discs, 3 cm. in diameter, are cut from various coloured papers of dull surface, and are viewed against a uniform white or black background. The observer's eye fixes the central point of the background, while an assistant moves a coloured disc, in a radial direction, either towards or away from the fixation point. Whatever be the real colour of the disc, it appears, when it first enters the periphery of the field, to be colourless—white if the background be black, grey or black if the background be white. When moved a little nearer to the fixation point it appears, in nearly all cases, to be either blue or yellow. Each disc is withdrawn as soon as the blue or yellow appearance is perceived, and all the discs thus employed are placed in two groups, according to whether they appeared blue or yellow. The blue group is found to contain all the following colours:—Bluish-green, blue-green, blue, violet, bluish-red, and rose-red. The yellow group contains the following:—Spectrum-red, orange, yellow, green-yellow, and all the yellowish-greens.

When, in the same manner as before, a coloured disc is moved toward the fixation point rather further than before, the initial appearance of blue or yellow changes, and tends towards red or green, according to the nature of the colour employed. Grouping the discs now, according as they appear to tend towards red or green, the red group will contain reddish-yellow, orange, yellowish-red, red, bluish-red, violet, reddish-blue, and rose ; while the green group will contain greenish-yellow, yellow-green, green, bluish-green, blue-green, and greenish-blue.

Reversing the experiment, the discs are moved from the centre towards the periphery of the field. Each disc, whatever be its actual colour, appears in nearly all cases to lose this colour and to become either pure blue or pure yellow, before it ultimately becomes colourless. For example, two similar violet discs may be so placed, one nearer to the fixation point than the other, that the one appears in its true colour, the other pure blue.

To this rule there are four exceptions. Pure blue and pure yellow undergo no apparent change except a loss of saturation ; pure green and a certain red (not spectrum-red) do not, like all other greens and reds, appear to change into blue or yellow, but appear in their true colours up to the point at which they appear colourless.

The grouping above described corresponds with the divisions of Hering's colour circle. Hering places yellow, green, blue, and red at points equidistant from each other around a circle, the yellow opposite to the blue, the green opposite to the red, and between them the transition colours. A line drawn across the circle from the red to the green divides it into two parts, the colours contained in which correspond respectively with the blue group and the yellow group distinguished by the first experiment above described. A line drawn from the blue to the yellow divides the colours into a red group and a green group corresponding with the two groups distinguished by the second experiment.

The four unchanging colours.—It is possible, then, to find four colours, a blue, a yellow, a red, and a green, which in indirect vision change only in saturation, not in colour. They correspond to the four fundamental colour-perceptions

of Hering. The retina affords the means of determining them in a purely experimental manner, which is independent of all theories. They are, in themselves, definite and constant, but this does not imply that in successive experiments, conducted under varying conditions, precisely the same colours will be selected, for it will depend much on the nature of the illumination and upon the condition of the retina whether slight variations of colour are perceived or not. Further, it must be noted that in conducting such experiments it is important to exclude the region of the macula lutea, for the excess of retinal pigment in this region causes chromatic absorption and modifies colour perception. Where great accuracy is required, therefore, only the extra-macular portion of the retina, *i.e*, the part which lies more than about 8 degrees from the fixation point, must be employed.

An unchanging blue and yellow can usually be found among papers coloured with ultramarine and chrome yellow. An unchanging red and green are more difficult to find, but by the following apparatus, which enables the observer to modify the colours with great nicety, they can be at all times obtained. A large board, which can be covered with white, grey, or black paper, has at its centre a small hole; through the hole passes a spindle carrying a small circular plate of metal, which can be rapidly rotated close to the surface of the board; upon a sharp pin in the centre of this the discs of coloured paper are concentrically fixed. Supposing that to a green disc it be desired to add more or less yellow, a yellow disc is placed beneath the green one, and both being cut through in one radius, a sector of the yellow is made to overlap the green. The colours being blended by rotation, the size of the yellow sector is altered until the desired colour is produced.

As already stated, the unchanging blue and yellow are easily found, while red and green are more subtle in this respect; unless they be very accurately chosen a faint blue or yellow makes its appearance so soon as the image falls outside that zone of the retina in which red and green are perceived; when accurately chosen all colour disappears at the point where the red or the green disappears. That the

method described permits of very accurate selection appears from the fact that, in a series of observations made under precisely the same conditions, the size of the superadded sector seldom varied by more than two degrees.

The four unchanging colours form two pairs of complementary colours.—With regard to the blue and yellow this is proved by blending, in the manner above described, a blue and a yellow paper on the rotating disc. If each of these be absolutely free from red and green, their mixture, in the right proportions, is entirely colourless. With regard to the red and the green there is rather more difficulty, for papers exactly representing the unchanging colours are not always to be found. Supposing it has been found that the red and green papers employed both require the admixture of a certain proportion of blue in order to produce the unchanging colours, then, when these papers are blended on the rotating disc, a sector of blue must be added, accurately proportioned to the red and green sectors, so as to supply to each the proportion of blue previously found necessary on testing each of these colours by itself. When this is done, the disc represents a combination of the unchanging red and the unchanging green, and the result is a total absence of colour—a proof that these colours are complementary.

Examination of spectrum colours.—By means of a special apparatus applied to the spectroscope the rays from any part of the spectrum are isolated, and are caused to fill a circular aperture which has an apparent diameter of 2·5 cm. The wave-length of the particular rays under observation is known by noting their precise point of origin in the spectrum. When the various colours are tested by indirect vision a yellow, a green, and a blue are found, which, like the unchanging pigment-colours already described, appear to diminish in saturation but not to change in colour, until they become colourless towards the periphery of the retina.

The wave-lengths of these three unchanging spectrum-colours are, according to the observations of Hess, yellow about 574·5 $\mu\mu$, green about 495, blue about 471, the variations

in successive observations being seldom more than 2 or 3 $\mu\mu$.* These figures agree pretty closely with the wave-lengths of the three cardinal points in the spectrum as ascertained by other observers. The spectrum-red, unlike the foregoing, proves not to be an unchanging colour; it must be blended with rays from the other end of the spectrum in order to produce an unchanging red.

These four colours, blended in the necessary proportions by means of a prism, the blue with the yellow, the red with the green, form, like the corresponding pigment-colours, complementary pairs, the resultant in each case being colourlesss. For all these experiments it is necessary to neutralise the condition of the eye beforehand as much as possible, by excluding all light from it for some minutes.

Disappearance of coloured discs on a colourless background of equal brightness.—As seen above, a coloured disc appears to lose its colour at a certain distance from the fixation point; it will therefore disappear entirely if the background be colourless and of equal brightness with itself. To this end it is, of course, necessary that the edge of the disc is not made visible by a shadow. The experiment is made as follows:—A large sheet of grey paper, having at its centre a clean-cut circular hole, is stretched upon a frame, and placed horizontally before the window; at a sufficient distance below this to be out of its shadow is placed the rotatory apparatus previously described, blending the necessary colours. Looking vertically downwards the eye sees the hole filled with colour—say with the unchanging green. Then looking more and more towards one side it receives the image of the hole more and more excentrically on its retina, until the colour disappears, and the hole is distinguished from the surrounding surface only by its greater or lesser brightness. The frame, which turns upon a horizontal axis, is then inclined a little towards or a little away from the window, until its grey surface assumes a degree of brightness precisely equal to that of the rotating disc seen through the hole. There is then a total and very surprising disappearance of the hole.

* $\mu\mu$ = a millionth of a millimetre = a micromillimetre.

Instead of sloping the frame a sector of white or black may be added to the rotating disc and varied in size until equality of brightness between disc and frame is obtained. The first method is, however, simpler and better.

Estimation of the white-value of pigment colours.— The white-value of coloured rays is, according to Hering, the brightness which they possess for those portions of the retina in which their colour is not perceived. This white-value may be measured by finding the equivalent grey, as in the experiment last described, and measuring the brightness of this grey. For example, to measure the white-value of the unchanging green, this colour is placed beneath the hole and the frame is sloped until, for the periphery of the retina, the hole is no longer visible. The green is then removed, and overlapping discs of white and black are substituted for it and blended in such proportions as to produce the same effect. The proportions of white and black employed indicate the white-value of the unchanging green. The normal white employed in the Prague Institute is a baryta paper, the black a cloth-paper (*tuch-papier*), the brightness of which, according to careful photometric estimation, is 1-60th of the white. The white-value of the blended sectors is expressed, therefore, by the size of the black sector divided by 60, plus the size of the white sector—in degrees of the circle. By this means the grey-equivalent of the green or the red can be determined with great precision, and when determined for any one part of the colour-blind zone of the retina is true for any other part of this zone.

The question arises whether the white-value of a colour is the same in the colour-seeing part of the retina; it is answered by the following experiment:—The complementary red and green are blended, and appear grey to the colour-seeing zone; the white-value of this grey is determined in the same way as before, and is found to be equal to the sum of the white-values of the red and the green sectors, which appears to show that the white-values of these two colours are the same for the colour-seeing as for the colour-blind zone.

The decrease of colour-perception from the fixation point

towards the periphery is equal for red and green, and equal for blue and yellow. — For the purpose of such comparison, it is necessary to employ colours which have the same white-value and the same colour-value,— that is to say, which excite colour-perception with equal intensity. Two colours have the same white-value when in indirect vision they both become invisible against the same grey background. They have the same colour-value when their mixture, in equal quantities, appears colourless to the colour-seeing zone of the retina. Experiment shows that when a red and a green disc of equal size, and of equal white- and colour-values, are moved along the same radius of the visual field, they become colourless at the same distance from the fixation point. The same is true of the unchanging blue and the unchanging yellow.

The dimensions of the red-green field are not constant, but vary with the conditions of the experiment. The larger the coloured disc the further from the fixation point is its colour perceptible. Thus, for example, the same red was visible against the same grey ground, at the following distances from the fixation point according to its diameter ; diam. 7mm., 20 deg. ; 10mm., 24 deg. ; 14mm., 27 deg. ; 30mm., 32 deg. Again, the more nearly the white-value or the coloured disc equals the white-value of the background, the further from the fixation point is the colour perceptible ; for example, a disc of unchanging red, having a white-value of 95 deg., on a grey background of the same white-value, was visible at 27 deg., on the outer horizontal meridian of the field ; on a black background it became colourless at 19 deg.; on a white background at 13 deg. Again, the ability of any given point in the retina to perceive colour varies with the fatigue to which it has been previously subjected ; perception is most acute when the coloured disc, instead of being constantly presented to the eye, is covered by a piece of paper resembling the background and only exposed for short periods.

Constancy of colour equivalents in different parts of the field.—It has been shown already that, for the colour blind zone of the field, an absolute equality can be established

between a red or green disc and a grey background, and that this equality holds good for all parts of the colour-blind zone. Carrying the experiment further and excluding, for the reason before stated, the macular region, a coloured ground is employed in the same way as before, and is matched by a blending of colours on the rotating disc beneath it ; the equality thus established for one point of the colour-seeing zone is found to hold good for all other parts of the field.

Without entering upon a discussion of rival colour-theories, Hess declares that he has tried in vain to reconcile his observations with the Young-Helmholtz theory, but that they find a simple and complete explanation in the theory of Hering.

P. S.

FUCHS (Vienna).—Keratitis Punctata Superficialis. *Wiener Klin. Wochenschr.*, 1889, *No.* 44.

Fuchs here gives a detailed account, with drawings, of a recently observed form of corneal inflammation, the main features of which he first described last year in his "Lehrbuch der Augenheilkunde."

The first symptoms of this disease are like those of an acute catarrhal conjunctivitis, but with an unusual amount of ciliary injection, profuse lacrymation, photophobia, and considerable pain. The characteristic corneal affection may appear two or three days after the beginning of the conjunctivitis, but more commonly later, its occurrence being sometimes delayed for several weeks. What commonly happens is that the patient seeks advice for his conjunctivitis, and, after a short treatment, gets so far cured that he resumes work. Some weeks, or even months, after the first onset, there is a recurrence of the acute symptoms, for which he again comes to the surgeon, who now finds the cornea studded with grey dots. These dots occur chiefly towards the centre of the cornea, leaving the periphery always com-

paratively clear. They vary much in number, but are, in the great majority of cases, very numerous. They are usually arranged in groups, sometimes circularly, sometimes in rows, the arrangement being easily seen when the dots are not too closely placed.

During the first few days they are very small, consisting of mere round points, with a few longish oval ones here and there: the grouping is evident even at this stage. The dots increase both in number and in size for some days, reaching a diameter of about half a millimetre. Not uncommonly two or three neighbouring dots join in forming one large spot. They are frequently found principally in one part of the cornea, *e.g.*, in one particular sector, only occurring as isolated dots over the remainder.

The individual dots have fairly sharp margins, and each has its centre of a more saturated grey than the general body of the opacity. With the aid of a strong magnifying lens, each is seen to consist of an aggregation of extremely fine points, which are arranged closely in the centre, giving it the saturation just mentioned. They are situated in the most superficial layers of the true cornea, immediately beneath Bowman's membrane, and they seem all to lie at the same level: the epithelium over them is pushed forward in the form of small knob-like projections. The cornea between the dots seems transparent on naked-eye examination, but by lateral illumination it gives a stronger grey reflex than normal, and a magnifying lens enables the observer to recognise in it a number of very fine grey points. These seem to be of the same nature as those composing the round dots, only smaller, less saturated, and less closely arranged. The more recent the case, the more pronounced is this dust-like opacity.

Occasionally one can also detect exceedingly fine grey lines, running through the cornea like cracks in ice, some of them branched, some traceable to the corneal edge. These are easily overlooked, on account of their extreme fineness, and they only remain visible for a short time, disappearing along with the diffuse haze. In addition to the dots and haze, small opaque whitish points are sometimes seen: these occur principally in recent cases, occupying the centre of

the dots, and also lying scattered in the intervening transparent-looking cornea. The tactile sensibility of the cornea remains for a long time diminished, or almost quite absent.

At an early stage, besides the corneal changes, there is hyperæmia of the iris, recognised by the narrowing of the pupil and by its yielding slowly and imperfectly to atropine. This congestion-myosis disappears along with the other inflammatory symptoms, and has never been found to result in a true iritis, with formation of posterior synechiæ. The intra-ocular tension is slightly diminished in some cases, but it usually remains unchanged. Apart from the effect of photophobia and lacrymation, vision is usually undisturbed, but it is occasionally interfered with by the dots, when they are placed close together in the centre of the cornea. In this way V. has been found reduced to $\frac{1}{7}$.

The progress of the disease is decidedly tedious. The more acute inflammatory symptoms do, indeed, usually disappear within a few weeks, but the eye continues irritable generally for a long time afterwards, and not infrequently there are repeated slight relapses of inflammation. The objective corneal changes take still longer to disappear. The diffuse superficial haze is lost first, and next the fine punctate opacity between the dots. The more saturated white points sometimes met with also disappear tolerably soon, while the typical round dots remain longest. These generally persist unchanged for a long time, then become gradually less dense, with less defined edges, and eventually disappear entirely. Some dots naturally become invisible earlier than others, so that their number would invariably diminish, were it not that occasionally new dots come into view in fresh places during the inflammatory relapses. Fuchs never found them disappear altogether within several months, and they usually take much longer, from one to two years. Permanent opacities remain only in the very exceptional cases where the dots develop into corneal ulcers.

In the absence of any histological examination of the corneal changes, Fuchs gives a conjectural explanation of them. The minute grey stippling of the whole cornea, seen in recent cases, he attributes to opacity of the small lymph-spaces containing the corneal corpuscles. He thinks that

these spaces are probably occupied by a substance which is turbid, or which at least has a different refractive power from that of the normal cornea. Similar changes, with a localised intensity, may account also for the opaque dots. The arrangement of the latter in groups or in straight rows seems to indicate that they originally form at the terminal branching or along the trunk of a corneal nerve.

A further argument in favour of the nerves being concerned in this affection is afforded by the fine grey lines occasionally seen in fresh cases; these are not infrequently traceable to the corneal border, and might well correspond to the canals in the corneal tissue in which the nerves run, which had also become filled with opaque exudation. The pressure thus exerted upon the nerve-trunks would explain the loss of corneal sensibility. In all probability this opaque substance is, principally, not due to wandering cells, since the dots develop so quickly, and since the whole process progresses so simply, and leads so rarely to the formation of ulcers. It is rather the result of a very feebly cellular, chiefly amorphous, fluid or semifluid exudation, which occurs chiefly in the form of round dots behind Bowman's membrane. Now these opacities, due originally to a mere fluid exudation, remain for many months almost unaltered; but it is not necessary to believe that the exudation itself remains in the cornea all this time. It is possible that the exudation so alters the adjoining corneal tissue that its transparency suffers: this secondary change may persist after the exudation has quite disappeared. In corroboration of this view is the fact that the signs of inflammation usually last only a short time, while the opacities remain long afterwards in eyes quite free from irritation.

The liability to this disease seems about equal in the two sexes. It is most common in the young, over ten and under twenty years of age. The youngest case seen was seven, the oldest fifty-two years. One eye only is usually affected; both eyes were, however, attacked in about one-third of the cases, either simultaneously or with a few days' interval. A true recurrence of the disease, after complete cure, was never observed. Fuchs first met with the affection in December, 1885, and between then and the date of this paper he had seen

thirty-six cases. He believes that, though rare, it is by no means new; and it has occurred, in his own experience, at Gratz as well as in Vienna. In preceding numbers of last year's *Wiener Klin. Woch.*, a very similar, if not identical, affection has been described by v. Reuss and by Adler, and named by them respectively *Keratitis maculosa* and *Keratitis sub-epithelialis centralis*.

As regards its etiology, many patients ascribe the disease to a chill. This explanation Fuchs considers probable, since it is especially common in the coldest months of the year, and since the beginning of the attack is often associated with nasal or bronchial catarrh and fever. From this association, and from the arrangement and superficial position of the dots, the affection seems nearly allied to the *herpes febrilis corneæ* of Horner; it differs, however, in the absence of herpetic vesicles in the face, in its being often double-sided, in the shorter duration of the inflammatory symptoms, and in the larger number of the spots. In herpes, too, the spots behave differently, changing into vesicles, and soon breaking down into ulcers.

As to treatment, Fuchs gives no recommendations, beyond saying that the catarrhal symptoms disappear under ordinary remedies. Possibly the dilute oxide of mercury ointment, with or without atropine, might be useful in promoting the rapidity of cure and the disappearance of the opacities.

R. MARCUS GUNN.

Commission of the New York Neurological Society ; Report on the Treatment of Epilepsy and Chorea by the Correction of Ocular Defects.—*Journal of Nervous and Mental Diseases, November*, 1889.

Reply of Dr. Stevens to the Report of the Commission to Examine the Proposition that Functional Nervous Diseases are largely dependent on Ocular Defects.—*Ibid.*

AMBROSE L. RANNEY (New York). Can "Eye-Strain" cause Epilepsy?—*Boston Medical and Surgical Journal, January* 2, 1890.

M. ALLEN STARR (New York). The Relation between Peripheral Irritation and Nervous Phenomena, with special reference to Eye-Strain.—*Medical Record, Jan.* 4, 1890.

In March, 1887, Dr. Geo. T. Stevens read before the New York Neurological Society a paper supporting the proposition that : "difficulties attending the functions of accommodating and adjusting the eyes in the act of vision, or irritations arising from the nerves involved in these processes, are among the most prolific sources of nervous disturbances, and more frequently than other conditions, constitute a neuropathic tendency." A commission was appointed to investigate the subject in conjunction with Dr. Stevens, including Drs. E. C. Seguin, W. R. Birdsall, David Webster, Wm. O. Moore, M. A. Starr, Frank P. Foster, and C. L. Dana, the last two having been added at the request of Dr. Stevens, to offset other members of the commission, whom he regarded as prejudiced against his proposition.

In arranging the plan of procedure, epilepsy and chronic chorea were chosen as typical neuroses, for the special subjects of investigation. Typical cases were to be selected, not complicated by any known organic disease, cases which had resisted approved methods of treatment for a reasonable time. Each case was to be examined by two members of the

commission, independently, to establish its nature, the general medical history recorded, and the examination for ocular defects made by Dr. Stevens first, and subsequently by any member of the commission. The patient was then placed under Dr. Stevens' treatment, and all medicinal treatment suspended. Cases in which the patient refused or neglected the treatment were not to be counted.

In all 22 cases were furnished by the commission, of whom 12 declined to continue under treatment, or were withdrawn by mutual consent : and 6 were furnished by Dr. Stevens, of whom 2 failed to continue under treatment. There were therefore 14 cases that continued under treatment from four months to two and one-half years, which furnish the basis of the report. The average duration of the period of treatment was over one year. The treatment appears to have consisted of the use of glasses, and of operations, so-called graduated tenotomies, and perhaps advancements of the tendons of the recti muscles of the eye. As many as 13 operations were done in a single case.

The results, as reported by the commission are : No case was cured. Of 5 cases of chorea, 3 were improved, 2 unimproved. Of 9 cases of epilepsy, 3 were improved, 5 unimproved, and in 1 the result was unknown. In some of the cases headache, vertigo, and diplopia have appeared during the treatment, and continue. In a few of the cases withdrawn, the abandonment of ocular treatment and the return to drugs, was necessitated by the great increase in frequency and severity of the attacks. The commission express the opinion that so far as this investigation warranted a conclusion, the method of Dr. Stevens does not afford a sufficient degree of relief to patients suffering from chorea and epilepsy to justify its adoption or recommendation, as a means of cure or as a sole therapeutic measure. All the cases remain indefinitely under treatment ; a perfect permanent equilibrium of the eye muscles not having been secured in any case. It is regarded as possible that insufficiency of the ocular muscles may be merely one of the conditions in a class of diseases in which the muscles are deeply involved, of which class epilepsy and chorea are examples, and that the tone of the ocular

muscles may vary with that of the other muscles of the body in accordance with the general condition of the patient, or of the special strain such as may occur in spasm. It is also possible that the tonicity of the ocular muscles is impaired by the long-continued use of the bromides. The commission complains that their investigation has been rendered more difficult and less fruitful through lack of co-operation on the part of Dr. Stevens, and his refusal to furnish the notes of cases in his possession according to agreement. The report of the commission is unanimous; and in the discussion which followed its presentation, Dr. Dana who had, more than any one else, secured the appointment of the commission, and who had been placed upon it at Dr. Stevens' request, stated that he had seen no case much improved under Dr. Stevens' treatment, and that he had lost most of his faith in it as a therapeutic measure.

Dr. Stevens' reply to the above report alleges bad faith on the part of the commission in not furnishing a sufficient number of cases, the delay being due to the exclusion of favourable cases, that all sent belonged to the class of incurables. He also protests against the report as based on an investigation of two diseases instead of the general proposition, and claims that references to cases withdrawn and not counted are improperly introduced to excite prejudice. He also claims that the report of the results of treatment minimised the importance of the malady at the beginning, and exaggerated the unfavourable conditions now existing, that the symptom in one of the cases reported as diplopia was really only the doubling of outline due to an uncorrected ametropia, that the cases properly included within the report were in every instance materially improved, and in several instances very notably so, one of these cases being the one reported as the result unknown. But no case, either of his own selection or the commission's, is claimed to have been absolutely cured. Appended to this reply is a note in which Drs. R. F. Wier, G. M. Hammond, R. W. Amidon, and A. L. Ranney, state that they had seen 8 of the patients in question at Dr. Stevens' office, and found that they all regarded themselves as improved by the ocular treatment.

Ranney argues energetically against what he styles "pre-

conceived notions about old methods," and for the careful study and mastery of "new methods" of testing the eye-muscles; and offers the history of one case as an answer to the interrogation of his title. The case is that of a youth of 19 subject to seizures spoken of as epileptic, but not described. The first had occurred at the age of 14. During the year prior to his first visit to Dr. Ranney he had been taking bromides of potassium and sodium, at the rate of 75 grains and upwards per day; and he was attending school, where "a room had been padded with mattresses, and specially kept for the protection of the patient when thus seized. Into this room he would be placed and allowed to thrash about, until attack after attack would prostrate the patient." During the year 34 fits had occurred. Examination of the eyes showed H. 0·5 D., adduction 54°, abduction 5°, esophoria 2°, and left hyperphoria ½°. With wearing prisms, base inwards, his esophoria increased in a few days to 10°. The tendon of the right internal rectus was then freely button-holed (partially severed from its insertion by an incision dividing the central portion of the tendon). The effect of the first operation being insufficient, a similar operation was practised on the internal rectus of the other eye. It having been found that the hyperphoria was right, and not left, and of "high degree," the right superior rectus muscle was subjected to a similar mutilation, without, however, fully correcting the tendency of the eye to turn in that direction, and prismatic glasses were again resorted to. During the 14 months elapsing since this treatment was instituted, he had eight convulsive seizures, occurring in two groups, both times after severe muscular exertion. His condition as regards the eye muscles is now right hyperphoria 2° (for which he wears a correcting prism), esophoria 2°, adduction 58°, and abduction 7°. Ranney speaks of him as restored to usefulness and health, and this "without recourse to poisonous drugs," the administration of bromides having been discontinued at the commencement of the "eye-treatment." R. says that most certainly "we know that this remarkable change is due to eye-treatment"; but the foundation for such an assertion seems very slender, except inasmuch as the eye-treatment was a means of making a

strong mental impression, and awakening faith in the confident prognosis, and with changed surroundings and an altered mode of life, seems to have benefitted, not radically cured, this case of nervous disease of uncertain nature. The final state of the eye muscles does not greatly differ from that originally found ; and the only measure adopted that has clearly exerted any permanent influence on their action is the wearing of the prismatic glasses. In epilepsy after the sudden cessation of large doses of bromides, there is usually a very marked increase in the frequency of the seizures, though this may be only temporary. This occurred in the cases of the commission. But in Ranney's case the seizures ceased with the withdrawal of the bromides, at the first visit, and did not recur for over seven months.

More space has here been devoted to this case than its real importance seems to warrant, because it has been claimed :

1. That faulty relations of the eye-muscles, through eye-strain, cause epilepsy, chorea, and similar disorders.

2. That these faulty conditions may be rectified, and these disorders cured, by " graduated tenotomies."

These claims from their startling character have attracted considerable attention. But they are thus far supported almost entirely by loose general statements, the above case seeming to the reviewer to be one of the very few so far published that lend a shadow of support to these claims.

Starr refers briefly to the history of the doctrine that grave neuroses are due to peripheral irritation, and to the claims that have been made for such operations as circumscision, urethrotomy, cauterisation of the clitoris, ovariotomy, &c., as measures for their relief. He points out that cases in which nervous phenomena are to be relieved by such measures exist, but are comparatively rare. Then when a peripheral irritation causes any general nervous disturbance, the local evidences of it, local impairment of function, discomfort, and pain are quite obvious, and have generally been manifest some time before the general disturbance begins. Even where reflex disturbances arise from peripheral irritation, they differ in character, and are to be sharply distinguished from the graver neuroses, such as insanity,

epilepsy, chorea, and hysteria ; and therefore they should not be spoken of as cases of those affections, which they may to a greater or less extent resemble.

The question, "are insufficiencies of ocular muscles common ?" is answered affirmatively. It is pointed out that muscular power is liable to great variations from time to time in healthy individuals, and still more liable to them in the neurasthenic. Heterophoria is present very frequently without causing discomfort. On the other hand, real strain of the eye-muscles does cause discomfort, as any one may prove to himself by the use of prisms. While it is recognised that ocular insufficiencies may produce characteristic nervous manifestations, observation shows that such cases of reflex neuroses are very rare. It is necessary to ascertain in any case of nervous disease whether or not any form of peripheral irritation is present. But unless it is serious and has produced discomfort, which has been spontaneously observed by the patient, not much importance is to be attached to it as an etiological factor, unless the nervous manifestations are of such character and mode of development as to point to a peripheral origin. Starr does not believe that true epilepsy or chorea can be produced by eye-strain or cured by its relief. E. J.

BEVAN LEWIS.—A Textbook of Mental Diseases. *London: Charles Griffin & Company*, 1889. *Royal Octavo, pp.* 541.

This book is a valuable addition to the literature of psychological medicine, and in itself merits commendation. It is divided into three parts. Part I., pp. 1—114, deals with the Anatomy and Physiology of the Brain and Spinal Cord; part II., pp. 115—431, is the Clinical Section ; part III., pp. 432—541, is devoted to Pathology.

We cannot here deal with this work in its entirety. In the first part, we find a well-expressed and carefully-written account of the anatomy, both coarse and minute, of the central nervous system. The author begins with the spinal

cord, and proceeds upwards, describing in turn the Medulla Oblongata, the Mesencephalon, the Thalamencephalon, and the Prosencephalon ; and concludes by remarks on the Encephalon in general, and the Cerebral Cortex in particular.

Part II. is that with which we are chiefly concerned, and it is with considerable disappointment that, in looking especially for an account of the eye symptoms in mental disease, we note an almost complete absence of reference to ophthalmoscopic examination of patients suffering from insanity. We believe we are correct in stating that the sole mention of the ophthalmoscope is in a footnote to p. 171, which refers to Dr. Clifford Allbutt's work, "The Ophthalmoscope in Diseases of the Nervous System."

Even in the chapter on General Paralysis, in which, as will be seen, the oculo-motor symptoms are discussed ably and at considerable length, no trace is discoverable of any reference to affection of the optic nerves. And yet, curiously enough, the author seems to value highly the evidence obtainable by ophthalmoscopic examination ; for in the place alluded to (p. 171), after quoting Dr. Allbutt's statement, that the optic disc is anæmic during the maniacal spasm, he proceeds to say : "The spasm of the retinal vessels presumably present in these cases appears to us of great importance in revealing the true nature of the maniacal process, as distinguished from states of mental depression." Although the earlier observers were doubtless inclined to lay too great stress upon appearances in the fundus oculi of doubtfnl pathological origin, there is, we think, sufficient evidence that ophthalmoscopic examination is of value, at least in some varieties of mental disease, and should certainly be deemed worthy of mention in a treatise of this kind.

In the chapter on General Paralysis of the Insane, 13 pp. are devoted to ocular symptoms, and, on the whole, this portion is clearly written, and is abreast of recent knowledge on these special symptoms.

Derangements of the extrinsic muscles of the eyes occur only in exceptional cases of this disease ; but the "intrinsic muscles of the eyeballs exhibit deranged innervation in some way or other, in all cases, at some stage of the affection."

The motor derangements of the intra-ocular muscles are indicated by (*a*) size of pupils; (*b*) inequality; (*c*) marginal contour; (*d*) mobility; (*e*) reflex adjustments, comprising pupillary reactions to (1) cutaneous or sympathetic stimulation, (2) consensual stimulation, (3) direct light stimulation; (*f*) accommodative adjustments; (*g*) accommodative power. Attention is directed in turn to each of these seven varieties. In the description of *paralytic myosis*, a slip has occurred, the writer saying: "the pupil may be small, as the result of paralysis of its dilator or circular fibres." He explains this condition as possibly resulting from a destructive lesion, in the cilio-spinal region of the cord, and adds a statement, that in such a case "the pupils no longer dilate with atropine." This, we think, is not quite correct, and should be written, "the pupils no longer dilate *fully* with atropine." The sentence above quoted and other remarks disclose the author's belief that the dilatation of the pupil is an active muscular effort, and not merely an inhibition of a tonic contraction of the sphincter pupillæ.

The writer thinks that some of the ocular symptoms are of real localising value. He says (p. 267) that the oculomotor disturbances (reflex-iridoplegia) are unquestionably greater on the side of the more deeply implicated hemisphere; and again, "when unilateral convulsions or paralysis occur in the early stages of general paralysis, the dilated pupil is on the side of the discharging or paralysing lesion."

In the chapter on Alcoholic Insanity we read: "The oculo-motor nerves are by no means so frequently involved as in the allied affection, general paralysis; the pupils are often dilated and sluggish in reaction; they are seldom unequal in size, and the most advanced cases show often no impairment in the reflex adjustments apart from indications of a localised sclerosis."

Nystagmus (as the result of cerebro-spinal sclerosis) is of somewhat frequent occurrence in chronic alcoholics.

The third or pathological section is, we venture to think, the most valuable portion of the book. It treats especially of the pathological anatomy of general paralysis, epilepsy, and chronic alcoholism, and the pages devoted thereto are full of interest. The illustrations throughout are models of

their kind ; the publishers have performed their part remarkably well, and both they and the author are to be congratulated upon the production of a book which we are sure will be welcomed by the medical profession.

TROUSSEAU (Paris). Ozœna and Infective Ulcers of Cornea. *Archives d'Ophtalmol. May—June*, 1889.

VAN MILLINGEN (Constantinople). Ozœna and Infective Ulcers of the Cornea. *Ibid*, *November—December*, 1889.

Trousseau in the two years preceding the date at which his paper was published had observed eleven cases in which the condition known as simple ozœna or atrophic rhinitis appeared to stand in causal relation to troublesome ulceration of cornea. In these cases there was no evident abnormality of the lacrimal passages, no epiphora or mucocele. The condition of the nose which he found in his patients was not one of ulceration of the mucous membrane, but was characterised by wasting of the mucous membrane and subjacent bony walls, accompanied by scabbing and great fœtor ; the nasal fossæ were abnormally spacious.

His attention had been drawn to the nasal disease by the intractable nature of the corneal ulceration, and his inability to find any other source of infection of the cornea. He gives notes of one typical case occurring in a female at 22. This patient had a suppurating ulcer of the lower inner part of the left cornea, with a large hypopyon. The ulcer was cauterised with the galvano-cautery, the anterior chamber was tapped and irrigated with sublimate solution, 1 : 2000, and instillation of eserine were prescribed. After four weeks' treatment, including two more cauterisations, the ulcer had healed. One month later the patient returned with a fresh ulceration, which lasted for six weeks, and was with difficulty cured. A second serious relapse soon occurred. Treatment of the ozœna was now begun, and in a fortnight the ulceration had healed. The ozœna was eventually cured, and there had been no return of the corneal affection two years later.

Lœwenberg, in 1884, described a specific coccus found in the secretions in ozœna, and other observers had previously discovered numerous bacteria. These germs have no difficulty in reaching the eye by way of the lacrimal passages, and infecting small ulcers or abrasions of the cornea.

The author points out the danger of such germs gaining access to an eye operated on for cataract, and advises the routine examination of the nasal fossæ in patients about to undergo extraction of cataract.

He has found sublimate solution, 1 : 2000, the best disinfectant to use to the nose in these cases.

Van Millingen publishes a table of all the cases (33 in number) of ulcerative keratitis caused by ozœna (chronic atrophic rhinitis) he has had under his care since 1880. Analysis of the notes of these cases leads him to make the following observations on the subject :—

Ulcerative keratitis of whatever form in a patient suffering from ozœna, follows an irregular course, and proves rebellious to ordinary treatment ; there are however certain forms of conjunctivitis and keratitis which are met with only in those who suffer from ozœna. The conjunctivitis which accompanies ozœna is very chronic, and the usual remedies prove inefficient ; there is rarely much conjunctival secretion, but abundant lacrimation and excoriations at the canthi ; there is hyperæmia of ocular and palpebral conjunctiva. From time to time phlyctenulæ develope, often complicated with some episcleritis. They usually encroach upon the cornea, and leave small irregular cicatrices. There is considerable tenderness on pressure through the lid upon these phlyctenulæ. Ulcers of the cornea caused by ozœna have their seat of election at or close to the limbus, and tend to perforate.

Van Millingen refers to Trousseau's warning of the danger of ozœna in patients operated on for cataracts and cites a case of his own, in which partial suppuration of the flap occurred ; it was arrested by free cauterisation. No cause for the disaster, except ozœna, could be discovered.

The lacrimal passages are often affected secondarily to

ozœna. Van Millingen draws attention to the atrophy of the mucous membrane of these passages which occurs in patients with chronic ozœna. The lacrimal sac becomes enlarged and filled with air, but there is no obstruction in the nasal duct. Crepitation is felt when the sac is pressed upon by the finger, and air is driven out of the puncta lacrimalia.

The author concludes: (1) that ozœna is frequently the cause of affections of the lacrimal passages; (2) that it is fairly often the cause of very characteristic disease of the conjunctiva and cornea; (3) that it may be the cause of infection of the wound in cataract extraction; and should be sought for in all such cases previous to operation.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, January 30th, 1890.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

Glaucoma after Extraction of Cataract.—Mr. Treacher Collins read this paper, based upon the microscopic examination of ten eyeballs, excised after sight had been destroyed. In nine cases the cataract was the ordinary senile form; in one case it was of traumatic origin. Five of the patients had undergone successful operation for cataract in the fellow eye. In one case preliminary iridectomy had been performed; in nine cases it was done at the time of removal of the cataract. The interval between the extraction and the onset of the glaucoma varied from three to twenty-one months. In three cases the increase of tension came on coincidently with iritis and keratitis punctata, and in these patients sympathetic ophthalmitis appeared in the second eye. In nine of the eyes there was adhesion of the lens capsule to the extraction scar, which helped to block the communication between the vitreous and the anterior chamber; in the remaining one, in which the lens had been

removed in its capsule, the hyaloid was adherent to the corneal cicatrix. In all the specimens the angle of the anterior chamber in the coloboma of the iridectomy was blocked, either by adhesion of the root of the iris, which had been left, or by the tips of the ciliary processes, dragged forwards by entangled lens capsule. After enumeration and discussion of the various causes to which glaucoma after extraction might be ascribed, Mr. Collins said he was of opinion, from the study of these cases, that adhesion of the lens capsule to the corneal cicatrix strongly predisposed the eye to an attack of glaucoma ; in some cases this adhesion, combined with an entanglement of iris, was sufficient to set up glaucoma ; in others, some additional irritation was necessary, such as resulted from a discission operation. The treatment of these cases was, in his experience, very unsatisfactory. In only one had he seen the glaucoma permanently relieved by operation ; in that case iridectomy and capsulotomy were performed after paracentesis of the anterior chamber had failed to relieve tension. Mr. Collins exhibited macroscopic specimens of the eyeballs, and showed some excellent magic lantern slides made from photographs of microscopic sections.

Mr. Critchett said the needle for discission of the capsule after cataract extraction should be graduated, so as not to allow the escape of aqueous humour. Many eyes were undoubtedly lost after cataract extraction, but that they should be destroyed by glaucoma was to him surprising, seeing that such cases should be under the direct observation of the operator, so that the condition ought to be at once relieved.

Mr. Priestley Smith said that Mr. Collins's paper was of much value, as it supplied more accurate anatomical information on the subject than we hitherto possessed. He thought these cases belonged to the category of secondary glaucoma. In the causation of primary glaucoma he regarded the lens as taking a very prominent part, but the occurrence of the condition in the absence of a lens was against that view. He alluded to one class of cases not included in this series—namely, glaucoma after successful needling operations, in which there was a clear

central pupil with no visible adhesions ; in these cases after excision there was found *iris bombé*, adhesion having occurred at the pupillary margin. In cases such as Mr. Collins described, sclerotomy was effectual if care was taken to divide the septum between the vitreous and aqueous chambers. In a case where sclerotomy was succeeded by but slight escape of fluid, a second incision, dividing this septum, was followed by a gush of fluid, and complete relief of tension. He would like to know if any case of glaucoma was known after a perfectly satisfactory extraction. In the case of a medical man, upwards of 80, an absolutely straightforward operation, followed unfortunately by contusion of the eye, resulted in great pain with increase of tension at night—probably due to swelling of the vitreous. An incision was made in the membrane across the centre of the pupil ; there was slight return of the glaucoma, but the eye subsequently recovered perfect vision.

Dr. Hill Griffith (Manchester) cited four cases in which glaucoma came on after extraction of the lens. In one, high tension followed the removal of an opaque lens ; in another it came on after an ordinary extraction, in which much cortex remained ; a third was followed by iritis and glaucoma ; and in the fourth, in which acute glaucoma with haziness of the cornéa occurred, the condition seemed to be instantly relieved by free discission. The tension returned twice, but after sclerotomy and then iridectomy, there was fair sight. Generally glaucoma followed some complication ; it had been more than usually disastrous of late after interference with immature cataracts. He thought the escape of vitreous might be a causative factor by mixing with the softened cortex and forming a paste round the margin of the anterior chamber.

Mr. McKinlay thought the present observations were much in favour ef preliminary iridectomy. This step was well under control, whereas other parts of the extraction operation were not so. The excision of the iris should be clean, and to the base ; afterwards, when the lens was extracted, a corneal section was of less moment.

Mr. Silcock had known glaucoma after removal of an immature cataract cured by iridectomy. In one case where

the capsule was entangled, the removal of a further portion of iris by a second operation was successful.

Mr. Collins, in reply, admitted the correctness of Mr. Critchett's remarks about the needles. The stout cylindrical needles were thought to cut better and to enter particularly well, but they permitted the escape of the vitreous, and had been discarded at Moorfields. In two cases where sclerotomy had failed to relieve glaucoma, the incision had not been peripheral enough, and the ciliary processes blocked the angle of the anterior ehamber. In answer to Mr. Priestley Smith's question with reference to glaucoma after satisfactory extraction, Mr. Collins said that it was very difficult to see entangled capsule, and still more so to detect entangled hyaloid of vitreous. Such accidents might explain the occurrence of glaucoma after apparently satisfactory extraction. The success following division of the septum between the aqueous and vitreous chambers, before alluded to, was consistent with this view.

Card Specimens.—The following living and card specimens were shown: Dr. Edridge-Green: Tests for Colour Blindness,—Mr. Lediard (Carlisle): Colour-testing Apparatus.—Mr. Stanford Morton: A Case of Alexia with Right Homonymous Hemianopsia.—Dr. J. W. Collins: Retinitis Albuminurica.—Mr. Lindsay Johnson: Congenital Corneal Growth.—Mr. Browning: Associated Movements of the Upper Eyelids with the Internal Recti.—Mr. Tatham Thompson: Cystic Detachment of Retina.

RECENT LITERATURE.

Miscellaneous.

Bock. Beitrag zur Kenntniss der Neubildungen des Auges.
Centralbl. f. prak. Augenheilk., Jan., 1890.

Christovitch. Sur le traitement Medico-chirurgical de quelques affections oculaires.
Rec. d'Ophtal., 12. *p.* 705.

Collins, Treacher. Curator's pathological notes.
Ophth. Hosp. Rep., XII. 4.

PARALYSIS OF OCULAR MUSCLES IN CONGENITAL SYPHILIS.

By J. B. Lawford, F.R.C.S. Eng.,
Assistant Ophthalmic Surgeon to St. Thomas's Hospital.

The rarity of paralytic affections of the muscles of the eyeball in the subjects of hereditary syphilis, judging at least from reported cases, induces me to publish the following notes of two patients whom I have recently had under observation.

Both were out-patients at the hospital, and this fact must serve as an excuse for the incompleteness of the notes. One of them (Case 2) was a man of the migratory class, and my efforts to trace him at the address which he gave have proved altogether unsuccessful.

In neither case was there any other likely cause for the paralysis, and in both patients congenital syphilis was almost, if not quite, a certainty. The evidence in its favour, apart from the oculo-motor paralysis, was good. Care was taken to exclude, as far as possible, acquired syphilis as a cause. Complete recovery in one and marked improvement in the other case, followed the administration of anti-syphilitic remedies.

Case 1.—Fanny F——. æt. 26, single, domestic servant, came to me at St. Thomas's Hospital, on November 11th, 1889. One month previously she had begun to suffer from supra-orbital pain on both the right and left side, vertigo and some vomiting chiefly in the morning. Her sight, which has been dim for some years, has, she thinks, become worse since the pain came on. Two weeks later (*i.e.* a

fortnight before she came to the Hospital) she noticed drooping of her left upper eyelid, which has gradually increased; the left eye has been painful during the same time.

Family History.—This could only be obtained from the patient. She is one of thirteen children, of whom only five are alive; six died in early infancy. Two or more of her brothers and sisters have had "fits," and one brother was operated upon for "cataracts" when seven years old.

When ten years of age the patient suffered from inflammation of both eyes; she was "blind" for a month and under treatment for ten weeks. Her sight has been defective since this attack. She has never, within her memory, suffered from skin eruption, ulcerated throat or other symptom of acquired syphilis.

Her physiognomy is very suggestive of congenital syphilis. The upper incisor teeth are stunted, the central ones notched, with defective enamel.

Eyes.—R. v = 8 J.;—2·5 D. $\frac{6}{36}$; L. v = 8 J.;—1 D. $\frac{6}{36}$ imperfectly.

R. Faint patchy haze of cornea: no ulceration. When examined with a magnifying lens the minute branching vessels so characteristic of former interstitial keratitis are visible in large numbers. There are several posterior synechiæ, and deposits of pigment on the anterior lens capsule, on which there is also a central opaque spot.

L. Cornea presents a very similar appearance, but the minute vessels are not so numerous as in the right eye. There is no evidence of previous iritis. Pupillary reactions normal.

Ocular Muscles.—R. E. Inward movement defective; other movements not impaired. No ptosis. Patient fixes with this eye, and there is little or no evident divergence. L. E. Almost complete ptosis, but with effort the lid can be raised a little. Divergence usually noticeable, but the globe can be rotated inwards rather better than its fellow. Upward movement slightly defective; downward and outward movement good.

Grey powder in small doses and iodide of potassium were prescribed.

November 18th. No evident change. Convergence power

is almost entirely absent, and the conjugate inward movement of each eye is defective, as at last visit.

December 2nd. Improved. Ptosis of left side less marked, movement of right eye inwards is apparently better than on her first visit (?). There is doubtful defect of downward movement of this eye. Three days ago patient had a "fainting fit." She has had similar fits before, in which she has sometimes bitten her tongue.

December 30th. Much improved. Ptosis entirely gone, movements of left eye of full, or nearly full, extent. There is still apparent slight defect of inward movement of right eye. Grey powder now omitted.

February 10th, 1890. Patient says she has quite recovered. There seems to be slight divergent strabismus of right eye; this must be an old condition; the eye can be rotated inwards, but patient fixes with the left eye.

March 24th. Keeps well.

Case 2.—Edward A——, æt. 25, drover, a patient at Moorfields Hospital under the care of Mr. Couper, to whom I am indebted for permission to publish my notes of the case. The patient first came under observation on September 4th, 1888. Three weeks (accurately 23 days) previously he noticed that he saw double. About the same time he had frontal headache and some vomiting, and since then has been sick on several occasions.

But scanty information about the family could be elicited. He is the third of six children; none of his brothers and sisters, so far as he is aware, have suffered from eye disease. Six years ago he attended at Moorfields for about six weeks, for an affection of both eyes (his former O.P. letter was not obtainable). Five years ago he had gonorrhœa; denies all other venereal disease; there is no history of symptoms of acquired syphilis.

His physiognomy is suggestive, but not typical, of congenital syphilis. Teeth small; enamel at crown of upper central incisors defective, and the upper canines are notched; but the teeth cannot be said to be characteristic.

Eyes.—R. v = $\frac{6}{18}$; L. v = $\frac{6}{60}$. The cornea of each eye shows old cloudy opacity very suggestive of previous

interstitial keratitis. There is no note of the appearance of vessels in the corneæ, though I have little doubt I looked for them. There are posterior synechiæ at the margin of each pupil, and in each eye at the periphery well-marked old choroiditic atrophy, in patches. No other ophthalmoscopic changes.

Ocular Muscles.—R. E. Movements normal. L. E. Slight but noticeable proptosis. Incomplete ptosis. All the movements of the globe are considerably limited, but those effected by the third nerve muscles more than that of the external rectus. The superior oblique is probably involved. In attempted downward movement the vertical axis is rotated inwards. Pupil larger than its fellow ; acts fairly well ; accommodative power not tested. There is diplopia in all parts of the field of vision, except from the fixation point outwards (to patient's left) about 45 degrees.

Grey powder in small doses and iodide of potassium were prescribed.

This patient only attended once again, a week or ten days after his first visit. He had by that time much improved. The ptosis was less, and the movements of the eyeball more free in all directions. He was told to continue taking the same remedies, and the probabilities are that he quite recovered.

In the above cases the paralysis was probably due to peripheral nerve disease, although in regard to the site of the lesion, Case 1 is less simple than Case 2. In the latter case there is scarcely a doubt that the lesion was situated either at or immediately anterior to the sphenoidal fissure, and was in all likelihood a periostitis, in which the nerve trunks became involved. The frontal pain may be interpreted as indicating some involvement of the fifth nerve. In Case 1 only some of the branches of the left third nerve were at first affected, and the weakness exhibited by the different muscles was unequal in degree. Such, however, is known to be not infrequently the case, in peripheral paralysis of this nerve (Gowers). The apparent partial loss of power in the right internal rectus must be explained by another

lesion, or by a pre-existing weakness of this muscle, and I am inclined to the latter view. My notes are defective on this point. In favour, perhaps, of a double lesion is the patient's statement that she had had bilateral, supra-orbital pain before the paralysis came on.

In searching for recorded cases of ocular paralysis in connection with congenital syphilis, I have looked through a large amount of ophthalmic literature, both British and foreign, and several monographs on syphilis, but I have succeeded in finding only three cases. The first is one recorded by v. Græfe and referred to in a paper by Sœlberg Wells*; a child, æt. 2 years, had paralysis of all the branches of the left third nerve; the right eye had been lost from syphilitic iritis. At the post-mortem examination there were found gross changes in the intracranial portion of the third nerve, described as a gummatous interstitial neuritis and peri-neuritis. There were areas of softening in the left corpus striatum and the right hemisphere.

The second case, reported by Nettleship,† is that of a girl, æt. 14, who had paralysis of the right third, fifth, and sixth nerves of four years' duration. There was abundant other evidence of inherited syphilis in her ears, teeth, palate, corneæ, irides, and choroids.

The third case is contained in Hutchinson's book on Syphilis,‡ and is that of a lad, æt. 16, who had partial bilateral ophthalmoplegia externa, and in addition complete atrophy of the optic nerves. He had characteristic teeth. There is no statement as to duration of the ocular paralysis; the sight had failed at the age of thirteen. Hutchinson refers to another case he had seen in a woman, but adds that there was a suspicion of acquired syphilis as well.

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* Ophthal. Hosp. Rep., vol. III., 1860, p. 26. Original paper in v. Græfe's Archiv. Bd. I. i. p. 433.

† Trans. Pathol. Soc., vol. xxxii., 1880, p. 13.

‡ Syphilis, by Jonathan Hutchinson, F.R.S. Cassell & Co., 1887, p. 208.

My colleague, Mr. Nettleship, has kindly shown me his notes of the case (unpublished) of a female, æt. 19, the subject of congenital syphilis, who was under his care at St. Thomas's Hospital in 1883, suffering from paresis of the left sixth nerve and double optic neuritis; the neuritis came on four weeks after the abducent paralysis. She had, four years previously, been under treatment for eighteen months, probably for interstitial keratitis which had left haze of corneæ; at about the same date she had been under the care of another surgeon for periostitis of tibiæ. There is no note of the progress of the case after the development of the papillitis.

The three published cases mentioned above, or, at least, those of Nettleship and Hutchinson differ from mine in the permanency of the paralysis; the lesion in each case was not improbably peripheral, *i.e.*, not nuclear.

Very few of the authors to whose works I have referred mention the occurrence of ocular paralysis in connection with congenital syphilis. Of course, syphilis is given in every book as a frequent cause of paralysis of the ocular muscles, but even when no definite statement is made the context almost invariably leads the reader to suppose that the reference is to the acquired form. There are some exceptions to this rule, however; in Græfe-Sæmisch, vol. vi., and in Mauthner's monograph, "Die Augenmuskellahmungen," congenital syphilis is specially mentioned as a rare cause of ocular palsy; no cases are given in the former work, but Mauthner relates v. Græfe's case to which I have referred above. Even in Alexander's recent work,* in which there is a chapter devoted to hereditary syphilitic affections, ocular paralysis fails to find a place.

* Syphilis und Auge. Wiesbaden, 1889.

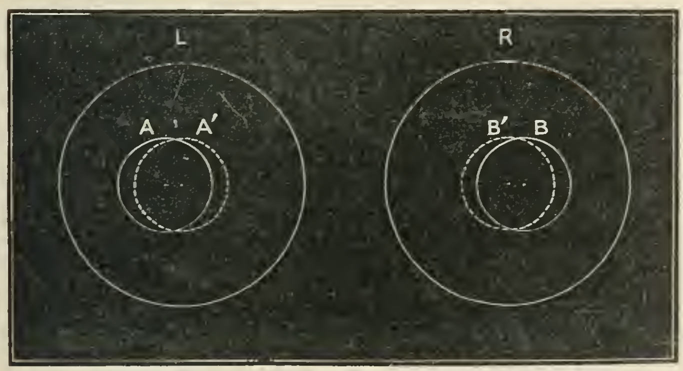
NOTE ON A STEREOSCOPIC EFFECT AND ITS APPLICATION.

By George A. Berry,

Ophthalmic Surgeon, Royal Infirmary, Edinburgh.

For the last six months I have been making occasional use of a stereoscopic phenomenon which I do not think has been previously studied. This consists in altering simultaneously the pictures presented to either eye so that the impression given also varies.

If, for instance, in the accompanying drawing the small circles occupy the positions A and B respectively, the stereoscopic impression is that of a hollow cylinder or cone with the small circle appearing further away than the large one. On the other hand, when the small circles come into the positions A′ and B′ the cone appears to be nearer, the small circle being next the eyes.



Now, if all stages of the transition between these two positions be presented to the eyes, the stereoscopic effect is one of movement in the third dimension. *The small circle rises from a plane lower than the picture to*

one which lies nearer the eyes. At the same time it appears to get smaller. The apparent movement is so evident if care be taken that the two pictures be properly placed in front of either eye, in a suitable stereoscope, that young children of 4 or 5 years of age are able to say at once if they see it. I find that it is most striking in semi-darkness.

No doubt other pictures might be made on the same principle which would even more readily attract a child's attention to the apparent back and forward movement. The seeing of the movement in the third dimension of course implies the existence of binocular vision. The phenomenon described is a simple and completely satisfactory test for binocular vision ; *it is not necessary to ask the individual tested if he sees a stereoscopic effect, but merely if he sees the to-and-fro movement.*

BJERRUM (Copenhagen).—On an Addition to the Ordinary Examination of the Field of Vision and on the Field in Glaucoma. *Nordisk Ophthal. Tidsskrift II.* 3.

In this paper Bjerrum proposes what he considers a useful little addition to the usual method of examining the field of vision, which, excluding small technical variations, such as the use of self-registering perimeters, is mostly conducted in an almost stereotyped manner. The addition consists simply in making use of white objects which subtend a very small visual angle. The test objects generally employed in perimetric measurements are from 1 to 2 centimetres in diameter, which, at a distance of 30 centimetres, the radius of the perimeter arc, correspond to a visual angle of from 2° to 4°. Their images must therefore cover many thousands of retinal elements, so that the test is far from being a fine one, and nothing at all comparable to the tests made for direct vision. In order to be able to work without difficulty with small visual angles it is

necessary to move the patient away some distance from the plane in which the test objects lie. Bjerrum has generally made these examinations at a distance of 2 metres, using a large black screen which can be let down from the ceiling to the floor, and which is placed on the wall opposite the space between two windows, so as to get good light all round. The screen has, of course, to be pretty large (2 metres in breadth), as at the distance of a couple of metres the blind spot, instead of measuring about an inch, as on an ordinary perimeter, measures 7 inches in diameter ; and everything else is in the same proportion. A screen 2 metres in diameter will admit of testing up to about 27° from the point of fixation, if that be in the middle of the screen ; to about 54° if it be at the edge.

As the extent of the field of vision diminishes with the diminution in the visual angle subtended by the test object, the central point of the screen can be used when the test is small ; and this is the most convenient arrangement. The objects used by Bjerrum are small circular discs of ivory fixed on to the end of a long dull black metal rod. They are of different sizes, from 10 mm. to 1 mm. in diameter. The examination is begun with a disc of 10 mm. at the ordinary distance (30 cm.), and afterwards continued, in suitable cases, with one 3 mm. in diameter at the distance of 2 metres. In the first case the visual angle is 10/300, in the second 3/2000, or approximately 2° and 5′ respectively. The normal boundaries corresponding to the first are familiar, viz., approximately 90° outwards, 70° downwards, 60° inwards, and 55° upwards (subject to slight individual differences, 5° or so). In the case of the 5′ visual angle, Bjerrum finds the boundaries average 35° outwards, 30° inwards, 28° downwards, and 25° upwards. He finds that considerably wider boundaries (up to 10°) are often met with ; but unless the patient's other eye can be utilised for instituting a comparison, it does not do to expect too great accuracy. Too much weight must not be attached to small concentric limitations. It is the irregular limitations, the more or less sector-shaped defects, and scotomata which are of the greatest importance. Individual peculiarities are found in the way of concentric limitations,

but never, under normal conditions, as marked indentations or scotomata. Variations in the illumination have certainly a somewhat greater influence on the results got by testing with the small images than in the case of the ordinary perimetric method. This, however, causes no alteration in the form of the field, unless there really are defects present, which are then more readily recognisable when the illumination is feebler. In making the examination with the 3 mm. disc at 2 metres it is well to correct approximately any existing ametropia ; but it is easy to satisfy oneself that minor degrees of incorrect focussing make no appreciable difference in the result.

For the normal eye Bjerrum has found that the maximum extent of the field of vision is only got for objects seen under a visual angle of $\frac{1}{2}°$ and greater. For smaller visual angles there is a gradual diminution in the size of the field. The blind spot has greater angular dimensions too when measured by the 3/2000 test. This Bjerrum ascribes to structural imperfection of the immediately surrounding retina.

He has examined a large number of patients presenting different pathological conditions. Thus in disseminated choroiditis the result of examination in the way described was to reveal the existence of scotomata, which otherwise, owing to their small size, or to there being only a somewhat diminished functional activity in the corresponding areas, escape detection by the usual method of examination. Ring-shaped areas of diminished functional activity, and of greater or less breadth, seem to be the rule in that affection. Often the defective area is not quite annular. These scotomata lie close up to the point of fixation, and sometimes involve it. On the other hand, in retinitis pigmentosa, in which, as is well known, one occasionally finds ring-shaped scotomata, the scotomata are not, as a rule at all events, found close to the point of fixation, but have their inner border about 20° from it. In this disease the small test objects often showed a very marked concentric limitation, which could otherwise not be detected in ordinary daylight. A very pronounced concentric limitation was met with, too, in certain cases, the objective

signs of which were keratitis punctata, iritis with synechiæ, and some vitreous opacities. An opacity existing in the transparent media will undoubtedly produce concentric limitation of the field tested with the small objects. It is therefore necessary to determine with the ophthalmoscope whether the veiling of the fundus is sufficient to account for the limitation. A comparison between the patient's two eyes may sometimes be decisive, as it may happen that the eye in which the fundus is clearly (or most clearly) seen presents the most marked functional defects—that is, the greatest limitation of the field. The exploration of the field may thus show that the affection exists all over the fundus, although there may be no ophthalmoscopic evidences of choroiditis and only few vitreous opacities.

The circum-papillary choroidal atrophy accompanying high degrees of myopia may or may not cause an enlargement of the blind spot as measured with the small object. Of this Bjerrum says, "A large scotoma in this region stretching close up to the fixation point is, of course, by no means a favourable sign even when the scotoma is not absolute."

In affections of the optic nerve information as to the distribution of functional activity over the field is afforded by Bjerrum's test which cannot be got by a less delicate one. The field of vision for small objects is often, comparatively speaking, good when the colour-vision is much reduced. The opposite condition may frequently be found in glaucoma, and more especially in diffuse choroido-retinitis, viz., good peripheral colour-vision for the ordinary perimeter test, but immense limitation for the small object. The field in optic nerve affections is, as a rule, by no means similar in form when tested with a small object as by the ordinary test.

In central amblyopia a similar method of testing enables one very readily to determine the boundaries of the scotoma, and to discover its most saturated part.

Bjerrum goes more fully into the results which his method has given in glaucoma. His attention was thereby drawn to certain peculiarities in the field in glaucoma which, although not met with in all cases, are both characteristic and unexpected. Eighteen of the 22 charts accompanying the paper represent the glaucoma field taken with a small

test object and contrasted with the same examined in the ordinary manner. With only one or two exceptions these all show that both the most defective area and that in which the function is best retained reach up to the blind spot. This condition is almost invariably found, notwithstanding that the actual shape of the field is subject, as one knows, to great variety. It is this condition, too, which is characteristic of glaucoma. For instance, a central or a paracentral scotoma, which is not uncommon in glaucoma, is found to spread towards the periphery in all directions (sometimes it does so more in one direction than in another), except outwards, where it never passes beyond the blind spot. Central scotomata in glaucoma differ therefore topographically from those met with in primary optic atrophy. At all events, there can only occasionally be a resemblance, and only at one stage in the development of the latter.

The glaucoma field then, as taken by Bjerrum's method, shows an interference in the function of the retina which, whatever be the part most affected, always starts from the papilla, and pretty clearly points out that, whether from pressure or otherwise, the defect is a result of a destruction of the fibres in the papilla at the margin or sides of the excavation.

Remarks by Reviewer.—The results obtained by Bjerrum are of particular interest to me, as I have had some experience of examinations conducted on much the same principle as he advocates. For some years past I have been in the habit of controlling or supplementing the ordinary test for scotomata, and the perimeter method usually made use of for measuring them, by making the examination of the particular area of the field at a distance of 5 or 6 feet or more (sometimes as much as 15 feet), so as, in the first place, to get a larger projection of the defective area, and, in the second, to be able to work with smaller retinal images without being obliged to use inconveniently small test objects. I am therefore able in some measure to endorse Bjerrum's statements as to the value of such a subjective examination. The examination takes some time, as it is necessary to carefully control the results, owing to the difficulty there is of feeling sure that the patient maintains an accurate fixation. Owing to this

circumstance, my own investigations in this direction have been much less systematic than those of Bjerrum. I have frequently tried to interest my clinical assistants in the subject, but it is only lately that anyone has taken it up here. I take this opportunity of referring to two classes of cases in which this method of examining may be of considerable diagnostic importance. In the important group of cases of central amblyopia differences will be found in this way which are very suggestive. It is from the results which I have obtained by mapping out the scotoma at a distance that I have felt some confidence in relegating to two quite different groups cases of toxic amblyopia and of the so-called retrobulbar neuritis, notwithstanding the tendency nowadays, owing to the results of anatomical investigations, to consider them identical. There are, of course, other facts in connection with these cases which render it probable that they are distinct as to their anatomical causation ; such as the invariable occurrence of toxic amblyopia in both eyes, and the all but invariable (possibly if other causes of amblyopia could always be excluded, the invariable) equality in the degree of amblyopia and extent of the scotoma in both eyes contrasted with the not infrequent unilateral character of the (rheumatic ?) neuritis and the usual dissimilarity in the amount of the amblyopia, as well as the extent of the scotoma when both eyes are affected. Apart from these, however, I believe it can always be shown, by making the test at some distance, that the scotoma in the toxic form of central amblyopia is well defined, with a distinct line of demarcation separating the normal from the defective area, and that its inner border does not extend much, if at all, beyond the macula (barely 2°, as a rule, from the point of fixation). The point of greatest saturation too, where a coloured object, if sufficiently small, is altogether invisible, is about midway between the point of fixation and the blind spot. On the other hand, the scotomata in neuritis cases have, when tested in the same manner, a less sharp and regular boundary, and are frequently found to extend much beyond the fixation point. Sometimes, too, more peripheral restrictions can be made out which never exist in purely toxic amblyopia. It is always a dangerous thing to lay too

much stress on the result of anatomical examinations, unless they are in perfect agreement with clinical experience. This, I take it, is very specially true with respect to inflammations of the optic nerve, which appear often to be diagnosed *post-mortem* without sufficient grounds, so difficult is it to feel sure that the anatomical changes met with are really of an inflammatory nature, and not merely due to some circulatory anomaly.

Another group, in which an examination of peripheral vision made at a greater distance than is usually done affords information of interest, contains cases of partial hemianopia. Scotomata are sometimes left after attacks of megrim. If these be small, it is only by examining at a distance that any idea can be got of the completeness of the blindness in the affected areas. Some time ago I examined a case of this kind which occurred bilaterally, and was able to demonstrate that the scotoma, which was not much larger than the blind spot, and very irregular in outline, was exactly similar in both eyes, and did not pass the middle line ; a fact very suggestive of its being of central origin, which could not easily have been discovered in the ordinary way.

G. A. BERRY.

MITVALSKY (Prague). On various forms of Septic Ophthalmitis. *Arch. Bohêmes de Medècine. T. III., Fasc.* 2 *and* 3.

Judging from the comparatively short French *resumé*, this paper, written in Czechish and illustrated by coloured plates, is one of considerable interest. By the term septic ophthalmitis the author understands the metastatic disease of eye which is met with in pyæmia and septicæmia, whether due to a special cause, as an infected wound, or arising in the course of certain diseases, as typhoid and scarlet fever, etc. The ocular affection may vary considerably, both in its clinical and anatomical features ; in some instances the chief manifestation is hæmorrhage in the retina, in others foci of suppuration ; at times a purulent and rapidly-spreading choroiditis occurs, while in the most severe cases there is panophthalmitis ending, if the patient survive, in atrophy of the eyeball.

As long ago as 1829 that form of septic ophthalmitis which sometimes occurs in puerperal women was well known and carefully described from its clinical side. In 1867 Knapp furnished details of the histological conditions met with ; Virchow had previously shown that puerperal panophthalmitis was caused by emboli in the retina and choroid. In 1874 Heiberg stated that these emboli were composed of micrococci. These observations have been confirmed by those of Litten, Hosch, Gayet, and others.

Mitvalsky gives notes of three cases of septic ophthalmitis, of which one occurred in the puerperal state, one during pneumonia, and one in a patient suffering from an acute febrile affection resembling typhoid.

Case 1.—Female, æt. 24 ; miscarriage ; puerperal fever ; double metastatic panophthalmitis ; death on the fourth day of the eye affection. The autopsy revealed endocarditis with valvular excrescences in which, as well as in the blood, streptococci were found. The right eye, examined microscopically, showed a purulent inflammation due to emboli of streptococci in the capillaries and the præ-capillary vessels of the retina. There were numerous hæmorrhages in the retina, and chiefly in parts of the retina which were free from microbe colonies.

Case 2.—Female, æt. 44 ; pneumonia. On the sixth day the left eye became affected by purulent choroido-retinitis, which led to perforation of the globe. After removal of the eye, the choroid and retina were found transformed into a purulent fluid mass, which filled the globe. From this material cultivations were made on gelatine and agar-agar, and slides prepared and stained for micro-organisms. Inoculation of rabbits' eyes was also practised, the material being introduced into the anterior chamber. Panophthalmitis occurred in the rabbits, due to staphylococcus pyogenes aureus. The same microbe was discovered in the slides made from the excised eye, and in the gelatine cultures.

The lung symptoms in this case persisted for an abnormally long time, and the author thinks pulmonary abscess may have been present and the metastatic disease of eye have resulted therefrom.

Case 3.—Male, æt. 31. On the third day of an acute febrile disease numerous subcutaneous and subconjunctival hæmorrhages appeared ; the patient died the next day. At the autopsy made six hours after death there was found advanced decomposition of all the organs and peculiar changes in the blood. This fluid was represented by a dirty lymph containing numerous small granules ; the corpuscles, both red and white, were all greatly degenerated, and streptococci were present in large numbers.

In the vessels of the eyeballs these cocci were abundantly present, but were not found in the tissues outside the vessels. The retina showed degenerative changes, the granule layers being in a state of suppurative inflammation.

Microscopic examination of the eyeball of Mitvalsky's first case and of a case reported by Wagenmann have shown that the emboli in the vessels of the retina and choroid consisted of collections of cocci ; in these two instances of streptococci. These emboli were more numerous in the retina than in the choroid. Mitvalsky is of opinion that the first changes set up by the cocci are those of inflammation, due to a chemical irritant produced by the microbes. In this connection he remarks that, inasmuch as the inflammatory changes in the choroid and retina appeared much more widespread than were the streptococci, the tissue changes must be caused by the toxic products of the microbes.

It may be useful to notice briefly the method employed by the writer to stain the micro-organisms in sections of eyeballs. He embeds in celloidine and stains with a solution of hæmatoxylin prepared with methyl-alcohol and glycerine. This, he maintains, is an efficient method for all the bacteria found in purulent affections of the eye, foi which purposes he has found Gram's and Löffler's methods unsatisfactory.

J. B. L.

E. FUCHS (Vienna). Text-Book of Ophthalmology. *Leipsic and Vienna : Franz Deuticke*, 1889.

Professor Fuchs disapproves the custom which still prevails among diligent medical students, in Vienna and elsewhere, of taking copious notes of lectures. During clinical lectures especially does this custom withdraw the attention of the student from the objects before him, and the subsequent writing out of the notes is a serious waste of time and energy. It is unquestionably of great advantage to the student, and later to the practitioner, to possess, in black and white, the words of his own teacher, with which he associates the impressions received, and the examples seen during his course of study, but to this end the lecturer, and not the student, should take the trouble to put the lectures in a permanent form. The book thus produced should meet the wants of the pupils not merely during their years of study, but in their future practice. The work before us was written for this purpose. We think that it is likely to be regarded as one of the very best text-books of ophthalmology, in any language, now in the hands of the profession.

Following the example of Arlt, his own teacher and predecessor in the professorial chair, Fuchs directs his teaching chiefly to the clinical symptoms of the various diseases of the eye, rather than to pathological anatomy or experiment, though these latter subjects are by no means neglected ; moreover, he attaches importance in greatest measure to the disorders of the anterior segment of the eye, which in practice are far the most numerous and the most amenable to treatment. The more deeply-seated diseases, operations, and refraction, occupy in proportion a smaller part of the work, being subjects which the surgeon cannot hope and should not attempt to deal with unless he is able to spend some considerable time in an ophthalmic clinic after the termination of the ordinary course of study. These subjects are, however, sufficiently and very clearly set forth in the later chapters of the work. Throughout the whole volume, which comprises nearly 800 pages, thoroughness and clearness are combined—the essential portions of each sub-

ject appearing in larger, the less important details in smaller type. Of the literary style we do not presume to speak, but every English reader will be grateful for the direct and simple construction and shortness of the sentences which distinguish this book from some other medical works written in the same language.

The illustrations, 168 in number, are not very numerous in proportion to the size of the volume, but are remarkable for their truth and artistic quality: very few have been borrowed from other works, the large majority being new, and extremely well adapted to explain the subject matter.

The work is divided into four parts.

Part I. describes the examination of the eye, first by objective methods, and secondly as to its functions. Speaking of the shadow-test, which he calls keratoskopie, and practices with a concave mirror, Fuchs says: "This method is very simple; of all methods it is the easiest to learn and has the advantage that it demands no consideration of the observer's refraction and accommodation; the results which it gives are as accurate as those obtained by any other method." This is the first unqualified approval of the shadow-test from a German author which we have yet seen, though the method has been very widely used by oculists in this country for some years.

The importance of mapping the visual field with regard to its form, extent, and the presence of scotomata, in relation to diagnosis and prognosis, is fully pointed out; curiously enough, the great advantage of the self-registering perimeter is not mentioned. The estimation of the light sense by the photometer of Foerster is explained, and this section ends with a description of various methods of distinguishing simulated from real blindness.

Part II., which constitutes the larger portion of the book, deals with the various diseases of the eye, and, following the principle above-mentioned, the author devotes a good deal more than one-third of it to the cornea and conjunctiva. From these admirable chapters we can only note a few points. Nitrate of silver holds its own against all recent substitutes as the sovereign remedy in all forms of catarrhal

and purulent conjunctivitis. As a general rule the use of a two per cent. solution applied to the conjunctiva with a camel-hair pencil, by the surgeon himself, more or less freely according to the nature of the case, and with careful avoidance of the cornea, is recommended as the best practice ; the application is to be made in the earlier hours of the day rather than in the evening, because less pain and irritation are caused thereby. Croupous conjunctivitis is regarded as an intense development of the catarrhal form, the secretion coagulating by reason of the excessive quantity of fibrin it contains. It is a disease of childhood, and is not related to laryngeal croup. Diphtheritic conjunctivitis is a purulent inflammation caused by inoculation with specific germs differing from those of acute blennorrhœa and trachoma. Lymphatic (phlyctenular) conjunctivitis and lymphatic keratitis are simply parts of one and the same disease, the commonest eye disease of children and due to struma. Unlike that of other ophthalmias, the irritation is greater in the earlier than in the later parts of the day ; the ulcers which often occur at the margin of the cornea and even involve the scleral tissue are peculiar to this disease. Dusting in of calomel is the most important item in the local treatment ; iodides must not be administered during its use. Under the head of exanthmatic conjunctivitis, which includes the forms associated with measles and small-pox, is described a variety frequently associated with acne rosacea. It closely resembles the lymphatic form, and, like the latter, is very apt to recur ; unlike the latter, it is met with only in adults suffering from the skin disorder above named.

The chapter on diseases of the cornea is one of the most complete and interesting in the book. The following brief extracts will serve to illustrate the author's manner of handling his subject. " In order to diagnose the form and stage of a keratitis the surgeon proceeds as follows :—He watches the reflection of the window on the affected part of the cornea, the eye being turned in the requisite direction. If the surface is dull the affection is recent ; namely, an infiltration or an abscess if there is no loss of substance ; an infiltrating ulcer if loss of substance is present. If the

surface is bright, the affection is older ; namely, a clear ulcer if loss of substance is present, a scar if no loss of substance is visible." . . . "It is certain that in every keratitis an increase in the number of cellular elements takes place, the aggregation of which produces the visible cloudiness of the cornea, and ultimately, if of high degree, passes on to suppuration. The source of these new cells is, however, still a matter of dispute. Some observers, of whom Cohnheim was the chief, regard them as white blood corpuscles which have migrated into the cornea from the vessels at its margin. Others, and pre-eminently Stricker, hold that they are produced by multiplication of the normal fixed cells of the cornea. My own observations convince me that in the cornea, as in other tissues, these two processes always go hand in hand." . . . "For practical purposes the several forms of keratitis are best divided into the suppurative and the non-suppurative. Every suppurative keratitis, since it involves destruction of corneal tissue, leaves behind it a permanent opacity which in many cases impairs the sight. On the other hand, when suppurative destruction of tissue has not occurred, a complete restoration of transparency and of normal vision is possible and in fact often takes place." . . . "Abscess of the cornea arises through infection with organisms which excite purulent inflammation in the corneal tissue. Many corneal ulcers are referable to the same cause, hence under similar conditions we sometimes get ulcers, sometimes abscesses. The etiological difference is that in ulcer the point of infection is near to the surface, while in abscess the infecting material makes its way more deeply." . . . "The infection producing an abscess may occur in two different ways : it either comes from without, or is brought by the blood to the affected part (metastasis)" . . .

The chapter dealing with the uveal tract is noticeable, amongst other things, for the sections treating respectively of the anatomy of this portion of the eye, of the circulation and interchange of fluids, of the relation of the uveal tract to the visual function, and of the development of the eye. A diagram is given to exhibit the various channels through which lymph leaves the eye ; there is, however, no statement

or other indication that the channels which drain the anterior chamber are enormously more important as regards the amount of fluid which traverses them, than the perivascular channels situated elsewhere, and the only perivascular lymph space which has been well established by physiological experiment, namely, that in the papilla, is not shown. At page 283 we read with some surprise, "atropine, besides paralysing the constricting fibres of the pupil, excites the dilating fibres." No one has done more than Fuchs to show that a muscular dilator has no existence in the human iris.

The chapter on glaucoma appears to us to be extremely clear and complete so far as regards the clinical description, but uncertain as regards the pathology. The author objects to the so-called retention-theory, on the ground that in many cases of glaucoma simplex, and occasionally also in inflammatory glaucoma, the application of the iris-base to the sclera and cornea is absent, and the filtration angle presents normal conditions. We believe that this dictum is based upon clinical evidence alone, which is entirely insufficient to determine the point ; closure of the filtration angle does not necessarily reveal itself by any visible change in the living eye. The great advantage of using cocaine in combination with myotics in some cases of glaucoma is not mentioned.

In the chapter on the disorders of the lens we see that the author gives the dimensions of that structure as though they were constant throughout adult life, and describes the changes occurring in advanced life without any reference to the increase of volume. A reference to the English literature of this subject, or to Becker's classical treatise would have obviated this omission.

The third section treats of refraction and accommodation ; the fourth of operations. We must conclude this brief criticism of Professor Fuchs's work, by repeating the high opinion stated at the beginning, namely, that it is one of the very best text-books of ophthalmology which has yet been produced.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MARCH 13TH, 1890.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the chair.

A Case of Primary Glaucoma at the Age of 22.—Mr. Spencer Watson read notes of this case occurring in a woman, the subject of microphthalmos and hypermetropia. The patient was engaged in needlework for sixteen hours daily. When she came under observation both eyes were glaucomatous, the right eye being more affected than the left. Operation was advised, but the patient did not give her consent till four weeks later, when double iridectomy was performed. The vision of the left eye improved, and its tension remained normal. A second iridectomy was performed on the right eye, and some improvement in vision resulted.

Dr. W. J. Collins asked if Mr. Watson had measured the corneæ in his case?

Mr. Brailey mentioned the case of a girl, aged 18, under his care, in whom glaucoma had supervened on microphthalmos; in this instance, there was nearly complete irideremia. The tension had been relieved by an equatorial scleral puncture, an operation which he thought preferable to iridectomy in such cases.

Mr. Spencer Watson replied that he had not measured the corneæ; there was no doubt about the microphthalmos.

A Case of Spontaneous Purulent Hyalitis occurring Nine Months after Successful Cataract Extraction.—Dr. Berry communicated this paper, which was read by the Secretary. The patient, aged 53, a glass-blower by trade, was operated upon for cataract of the left eye on March 19th, 1889. Everything went well, and he left the hospital on the eleventh day, the wound being then soundly healed. Vision with + 11 D was $\frac{30}{40}$. Patient resumed work a month later. On December 20th he was re-admitted with intense pain in, and almost complete loss of vision of, the left eye. He had

left work at 4 P.M. the previous day, and was reading until 9 P.M. At midnight he was awakened with severe pain in the globe, and on presenting himself twelve hours later there was acute purulent iritis with hypopyon; T + and vision reduced to counting fingers with difficulty. No improvement took place, and the eye was enucleated on January 2nd, 1890. Immediate examination of the eyeball showed extensive purulent infiltration of the vitreous, with abundant hæmorrhages in the retina, the choroid being to all appearance healthy. Microscopic sections showed that there had been accurate apposition of the lips of the corneal wound. The iris was nowhere adherent to the cicatrix, but there was a slight flat attachment to the cornea in front of it. The suppuration appeared to have commenced behind the margin of the cornea, as a few cocci were found scattered among the cells of this part. The choroid and deeper layers of the retina appeared healthy. Dr. Berry said that the possibility of a sudden violent septic hyalitis taking place spontaneously so long after an extraction was new to him, and the case was all the more astonishing in that, not only with respect to the acuity of vision, but also from an operative point of view, it had been completely satisfactory. A somewhat similar case had occurred in Dr. Argyll Robertson's practice, the patient being a cook, aged 55. Nearly eleven months after a successful cataract extraction, the eye had to be removed for suppurative panophthalmitis. This case further resembled the writer's in that the patient was exposed to great heat. The sudden onset and malignant nature of the inflammation in both instances left no doubt that it was the result of septic infection; but as it was quite impossible that micro-organisms introduced at the operation could retain their vitality so long without showing signs of activity, there must have been some recent inoculation of the cicatricial tissue. This explanation was that adopted by Mr. Swanzy, who, in 1871, published three cases in which peripheral prolapse of the iris had been followed after a prolonged interval by a spontaneous and uncontrollable purulent iridocyclitis. The presence of micro-organisms in eyes thus attacked was demonstrated by Leber, and recorded in an article in *Graefe's Archiv*, 1878, on "The Intercellular

Spaces of the Corneal Epithelium ;" he stated that the bursting of an attenuated portion of a peripheral anterior synechia took place either spontaneously or as the result of a trifling lesion, and infection began at this point. Dr. Berry had lately been able to confirm this supposition by the discovery of micrococci in the vitreous in a case in which purulent hyalitis took place a long time after a perfectly normal iridectomy for glaucoma simplex. Mr. Priestley Smith had recorded a case of purulent hyalitis occurring spontaneously in an eye two years after cataract extraction. In his case there had been a slight encleisis of the iris. In one mentioned by Arlt there was a prolapse of iris, the size of a pea, incorporated in a cystoid cicatrix, from which, after fifteen years, a sudden panophthalmitis originated.

Mr. Brailey cited a case of spontaneous, bilateral, purulent hyalitis, which was associated with obstinate constipation ; and suggested the possibility of autogenetic septicæmic infection as having a share in inducing the condition.

Mr. Marcus Gunn mentioned a case belonging to the same category in which purulent iritis and hyalitis occurred three weeks after cataract extraction, without any prolapse or adhesion of iris, the cornea remaining clear.

Mr. Nettleship said cases such as those reported by Dr. Berry were new to him, and spoke of their importance, both from a clinical and pathological standpoint. He was familiar with cases in which an eye, blind from old corneal affection or glaucoma, suffered from violent inflammatory attacks similar to that mentioned, though, whether this occurred in the absence of any previous perforation, operative or otherwise, he could not say. Though spontaneous iritis, not following operations (for example, cases of pseudo-glioma), might be due to septicæmia, such a supposition did not aid the explanation of the present cases. It was remarkable that in both the instances cited the eyes had been exposed to great heat.

Mr. Brailey said there was no doubt that some eyes suppurated without local wound, as after complete glaucoma which had not been operated on. Between pseudo-glioma and the cases under discussion there was the marked distinction that in the former suppuration was limited to the

vitreous and retina, the choroid escaping; so that the globe, though soft, retained its bulk, whereas in panophthalmitis it quickly shrunk.

Mr. Warren Tay mentioned a case of purulent hyalitis or panophthalmitis in one eye, following the arrest of discharge from an abscess in the side. After enucleation the vitreous was found full of pus. There was no local inoculation. He also mentioned the case of a woman who lost both eyes by a condition resembling pseudo-glioma after confinement. There was shrinking of the globes; the septic disease was probably embolic.

The President alluded to an observation made by him long ago, that there appeared to be swelling of the discs in pyæmia; this might also be the case in the surgical disease.

Note on the Metre-angle in Latent and Manifest Muscular Deviations.—This paper by Dr. Berry was read by the Secretary. Dr. Berry said that although Nagel's metre-angle notation was familiar to all ophthalmologists in its theoretical aspects, it was not largely employed in practice as a standard of measurement in ocular deviations. The visual acuity and refraction were always noted, and, though no doubt it was more important to do this than to determine the amount of manifest or latent deviation, he thought that having adopted the metrical system of measuring refraction it was consistent to note the deviation in metre-angles. For latent strabismus this can be done as quickly as the determination of visual acuity in the ordinary manner. The measurement of manifest deviations cannot be so rapidly effected, but still it requires no more time than is requisite for its estimation in degrees. He wished to draw attention to the angle that has to be looked upon as the extent of the deviation recorded in metre-angles. In the angular measurement of squint it is only necessary to determine the extent to which the visual axis of the squinting eye deviates from the line connecting its centre with the point of fixation of the other eye. For Nagel's notation the degree of convergence, and not merely that of deviation, has to be determined, and in the case of squint this is only *half* of the deviation. If the two eyes are directed to an object $\frac{1}{2}$ metre distant in the middle line there are said to be 2 metre-angles

of convergence; the deviation from the perpendicular is the same for both eyes. If the object of fixation is moved to either side till it is exactly opposite one eye, the whole deviation from the perpendicular is taken up by the visual axis of the other eye. The angular deviation is doubled, but there are still only 2 metre-angles of convergence. The same obtains in squint in which only one eye fixes. Therefore the proper existing association between accommodation and convergence in the case of a squint is given by the measurement in metre-angles of half of the angular deviation.

On the Immediate Effect of Tenotomy on the Concomitancy of a Squint.—This paper by Dr. Berry was read by the Secretary. Dr. Berry referred only to complete tenotomy, and expressed his doubt as to the justification of so-called partial tenotomies for the cure of epilepsy, indigestion, and other disorders. He measures, in his cases, the degree of deviation and the accuracy of concomitancy, *i.e.*, he determines the amount of the error of convergence (positive or negative) in the primary position, with the fixing eye directed straight forwards, and also when the object of fixation is carried some distance (about 30°) to either side. As soon as the tendon of one rectus muscle is divided the concomitant character of the squint is modified, so that the effect produced by the operation differs in amount according to the direction of fixation. For instance, if the right internal rectus is tenotomised for convergent strabismus, the effect of the operation is more marked, as the fixing eye is moved from the middle line towards the left, and less marked with movement in the opposite direction. This is due to the insufficiency of the right internal rectus, resulting from the tenotomy. The writer asked why the effect should continue to diminish after the axis of the deviating eye has crossed the middle line and is directed outwards, and stated that such was invariably the case for some time after the operation. When there is diplopia, the same gradual change in the extent of remaining convergence over the lateral direction of the field of fixation may show itself in a manner which throws some light on the altered relations of the opposing muscles. Thus there may be

crossed diplopia to the side of the squint, and homonymous diplopia on fixation in the other direction, notwithstanding that there is still convergence remaining in both directions.

Card Specimens.—Mr. Marcus Gunn: Two cases of Superficial Punctate Keratitis.

Mr. Beaumont: A case of Neuro-retinitis.

Mr. Redmond (Dublin): An Electric Drill for discission of tough capsule after extraction.

Mr. MacKinlay: Traumatic Irideremia and Aphakia with retention of good vision.

Mr. Doyne: (1) A case of (?) Tuberculosis of Choroid; (2) a case of Paresis of both External Recti.

Dr. W. J. Collins: Cast of an Eyeball, with equatorial staphyloma following complete glaucoma.

Mr. Stanford Morton: Fibrous Changes at the Optic Disc.

At a largely attended Special Meeting of the Society held on March 6th, in the Physiological Department of University College, Professor Schafer gave a demonstration of the ocular movements produced by electric excitation of certain areas in the occipital and frontal lobes of the monkey. At the close of the demonstration Professor Schafer showed a diagrammatic representation of his views as to the projection of the retinæ upon the occipital lobes.

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A NEW TEST FOR HETEROPHORIA.

By Ernest E. Maddox, M.D., Edinburgh.

There is a simple test for latent deviations of the eyes which is within the easy reach of all who are interested in their study, since the only apparatus absolutely requisite is a glass rod, such as most will have already in their possession.

Any glass stirring rod will do, provided it does not taper. The rod supplied by Messrs. Burroughs, Welcome & Co. in their hypodermic case, for the purpose of crushing their small tabloids, often serves the purpose well.

The principle of the test depends on the property of transparent cylinders to cause apparent elongation of any object viewed through them, so that in looking at a distant flame, with a glass rod before one eye, it appears converted into a long thin line of light, so dissimilar from the flame itself, as seen at the same time by the other naked eye, that there remains practically no desire to unite the two images, whose relative position indicates the conditions of equilibrium in the two eyes. The length of the rod is immaterial if not less than a third of an inch: the best thickness is a quarter of an inch.

The importance of avoiding a rod that tapers at any part likely to be used is, that it would have a conical effect, and thus a prismatic action in addition to its cylindrical one. Freedom from this defect may be ensured by testing the rod itself, as follows: Hold it a little to one side, so that it only covers part of the pupil: the flame is then seen partly through the rod as a line of light, and partly past it, as a flame; or, in other

Ophth. Review, Vol. IX. No. 103. May, 1890.

words, the flame and line are both seen by the same eye. If the rod is free from tapering at the part tested, the line passes exactly through the flame; if otherwise, the rod tapers *towards* the direction in which the line appears displaced, in accordance with the fact that prisms cause apparent displacement of objects towards their edge. Though not essential, it is better to choose a rod with a smooth and regular surface, free from longitudinal grooves, which cause the line of light to appear broken and interrupted by unsightly notches. Transverse grooves are of course inadmissible in the portion of the rod used, as they come under the head of local taperings. The line of light is always exactly at right angles to the axis of the rod; so that to produce a vertical line with which to test horizontal deviations, the rod is held horizontally, and to produce a horizontal line with which to test vertical deviations, it is held vertically.

Care must be taken that the rod covers the entire pupil, so that the flame is not seen by the same eye as that which sees the line of light. The difficulty of always ensuring this in practice makes a little accessory to the rod almost indispensable. It consists of a disc of thin metal or cardboard, which is most conveniently made of a size to fit into any ordinary trial-frame, and punched out with a rectangular slit in the centre about half an inch long, and slightly narrower than the rod, which is fixed close to the slit, or in it. To permit of free rotation in a trial-frame, the rod should be so short as not to reach quite to the edges of the disc. The test is made prettier, and any desire for single vision still further reduced by holding the rod before one eye and a piece of coloured glass before the other.

To test for heterophoria, stand the patient at six metres from a small flame, such as a gas-jet turned down till it is only a quarter of an inch high (or a more distant street-lamp will do as well), and place the rod horizontally before one eye, a coloured glass before the other. If the line passes through the flame, there is

orthophoria as far as the horizontal movements of the eyes are concerned. Should the line lie to either side of the flame, as in most people it will, there is either latent convergence or latent divergence manifested; the former, if the line is the same side as the rod (homonymous diplopia); the latter, if to the other side (crossed diplopia).

If relative convergence should be demonstrated, the patient may be made to advance towards the light till the line passes through the flame: the flame then lies at his "point of coincidence" if he has one, and its distance can be measured. On advancing still further, the line will probably cross to the other side, showing relative divergence, until the near point of accommodation is reached, when it may again give way to convergence, though this is less easily demonstrated by this test than by the scale test described elsewhere. There may, of course, be no point of coincidence, but convergence throughout, for all distances, as in some hypermetropes, and some few myopes, though rarely in emmetropes. It is very rare to find any point of coincidence (except that at the near point) in cases where there is ever so little divergence for distance; indeed, I have not met with a case. The significance and frequency of these differences may be left for another paper.

So much for horizontal deviations now for vertical ones. Hold the rod vertically, so as to produce a horizontal line of light. If the line pass through the flame there is no tendency to vertical deviation, but if it appear above or below it there is "hyperphoria" of that eye which sees the lowest image; that is, if the flame is lowest there is a tendency to upward deviation of the naked eye; if the line is lowest, of the eye before which the rod is.

These deviations, whether vertical or horizontal, may be *measured* in two or three ways. Prisms of increasing strength may be placed in succession before the naked eye, till that prism is found which brings the line and

the flame together. In testing for hyperphoria the edges of the prisms should be up or down: *up* if the flame appear lower than the line; *down* if the flame appear higher than the line. In testing for horizontal deviations, their edges should be in or out: *in* if the diplopia is homonymous; *out* if it is crossed. The deviation is half the refracting angle of the prism.

Another way is, in testing for hyperphoria, to place a prism before the naked eye in a trial frame with its edge in or out, and slowly rotate it till the flame and the line meet. This method is a very good one, but has the disadvantage of needing a calculation, from a table of sines. The sine of the *deviating* angle of the prism, multiplied by the sine of the angle of its rotation, gives the sine of the deviation of the eye. A trial frame, however, could easily be marked with degrees of deviation for different rotations of a known prism, and thus calculation be saved.

Another method still, the principle of which is, I think, a new one, is to use two flames instead of one, such as two candles, or two movable gas jets; on looking at these with a rod before one eye two lines and two flames are seen. If both flames have a line passing through them there is no deviation, but if otherwise, the flames are made to mutually approach or recede from each other till the central flame and line meet, when their distance apart measures the heterophoria. The efficiency of the rod test is least manifest in uncorrected myopia, since the line of light becomes a diffusion band, in the centre of which the flame lies, if there is no deviation. The test is of course still available, but its delicacy is impaired. It is for vertical deviations especially that the tests already in use are most unsatisfactory, since greater accuracy is needed, and yet stronger prisms (with proportionate risk of accidental errors) must be used than in testing for horizontal deviations. The rod test is as good for one as the other, and possesses the great advantage over prism tests, except with the obtuse

prism, that the result is not appreciably affected by slight rotations of the rod, or small inclinations of the head. The time spent in securing exact rectitude of position is thus saved.

The obtuse prism to which I have just referred has been described elsewhere,* but, since its use led to the rod test, may be briefly mentioned again. It may be regarded either as a single obtuse prism with an angle of about 174° or as two weak prisms of 3° united by their bases. On looking through the line thus formed, at a distant flame, two false images of it are seen, one higher and the other lower than the real image seen by the other eye, the position of which to the right or left of the line between the two false images indicates the equilibrium of the eyes. A faint band of light, of the same breadth as the two false images, is seen extended between them, the explanation of which was shown by Dr. George Berry to be that the edge of the obtuse prism is not a mathematical line, but, from imperfect manufacture, a rounded ridge. He noticed that the band was transversely striated with exceedingly fine dark stripes, evidently due to "interference" similar to that which Fresnel obtained with mirrors, but which is in this way obtained by refraction. The rod test was an easy deduction for me from the effect of the rounded ridge.† It is, I believe, the only existing test for latent deviations dependent on alteration in the *shape* of the images.

* Oph. Rev., Dec., 1886, p. 348.

† The double prism is made by Messrs. Curry & Paxton, London. Mounted rods can be obtained for half a crown from Prescott, optician, Edinburgh.

A SUGGESTION AS TO THE FUNCTION OF SOME OF THE RETINAL ELEMENTS.

By George A. Berry,

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Notwithstanding that our knowledge of the histology of the retina may be said to be fairly complete, and that much has been done in the way of experimentally analysing its functions, we are still very much in the dark as to many of the most elementary points in the physiology of vision. What, for instance, is the *rôle* played by the several so-called end-organs, the light-receiving elements of the retina, whose stimulation affects the transformation of energy which leads to vision?

Three different elements of the retina are generally supposed to be more or less directly percipient, viz., the cones the rods, and the pigment contained in the hexagonal cells. Of these, the only one which is at all regularly distributed over the whole extent of the retina is the pigment. Only one function, too, of the retina is pretty much the same, whatever be the portion of it which is stimulated. That function is the sense of light—the power of distinguishing light from darkness, independently of any difference in the quality of the light, or any idea of figure. From this coincidence, as well as from the fact that all disturbances of the retinal pigment interfere more or less with the perfection of the light sense, it may be inferred that the pigment is the main, if not the only end-organ, for that sense.

Again, as to the cones, there can be little doubt that it is to the existence of these structures that we owe the power of being able to differentiate the various impressions formed over any given area of the retina, *i.e.*, to become conscious of an image of form. The experiments which connect the acuity

of vision, or the form-sense, with the cones are familiar. I do not propose to discuss them here, but pass to the third end-organ—the retinal rods. As these do not exist at all at the most sensitive part of the retina, they cannot be necessarily concerned in either the sense of colour or of form. What, then, is their function? Are they end-organs at all? Histologically, it seems almost certain that they are. They might be, and indeed have been supposed to be, form-sense end-organs of a much less perfect nature than the cones. This seems improbable, though it is difficult to see how it can be proved not to be the case. It is improbable, first, on account of the nature of the peripheral distribution of the cones, which not unlikely fairly corresponds with the peripheral acuity. On this latter point, however, further experiment is necessary. The problem of demonstrating a direct connection between the arrangement of the cones and the visual acuity at any point is indeed one which presents very considerable, if not insurmountable, difficulties. The facts to be ascertained before the question could be definitely settled, viz., the law governing the diminution of vision peripherally, the dioptric conditions which determine the position, size, luminosity, etc., of the peripheral retinal images, and the histological determination of the corresponding distribution of rods and cones, may not admit of sufficiently accurate investigation. We know that the visual acuity slowly diminishes on passing from centre to periphery, and that the proportion of cones to rods diminishes; so that while the number of cones over a given area diminishes, the number of rods, on the other hand, increases. But, as we do not know the law in either case, we cannot with certainty altogether exclude the rods as form-sense end-organs.

It is rather a suggestive fact that there should be, as has lately been shown to be the case, such a relatively large proportion of the fibres contained in the optic nerve connected with the supply of the central or

papillo-macular area of the retina. From this alone it is pretty evident that the rods have nothing like as extensive or important a nerve connection as the cones. If they are end-organs at all, they must have some subordinate function.

So far we have left out of consideration altogether the two reflex functions of the retina, viz., the mechanism by which its stimulation causes, on the one hand, contraction of the pupil, and, on the other, movements of the eye leading to fixation. The contraction of the pupil is so much more marked when light falls on the centre of the retina than when the same amount of physical stimulus affects more peripheral parts that there can be little doubt that the fibres through which the afferent impulses pass to the reflex centre are more intimately connected with the cones than with the pigment cells. If this be the case then for the centre, it is probable that it is also the case for the periphery. There is no reason to ascribe to the rods in this situation a function which is performed by the cones in another situation.

But what of the remaining reflex? The more peripherally an image is formed on the retina, the more forcible has the muscular contraction to be which will bring it on to the fovea. No doubt the knowledge acquired by constant habit of the muscular force required to bring about the corresponding alteration in the position of the eye gives rise to the consciousness of the position of an object seen indirectly, relatively to that which is fixed, or, in other words, to the manner in which the projection of such an object takes place. Is it not possible that the rods are the end-organs of projection and of movements started in the interest of fixation? It is true there is nothing to prove such an assumption. Although I have frequently discussed this idea with others who are more familiar than myself with the histology of the retina and its central nerve connections, I have never

heard of anything which could be looked upon as an anatomical indication of its possibility. On the other hand, there is, so far as I know, nothing which renders it impossible.

Let us see what can be advanced in favour of such a hypothesis in addition to what has already been said as to the little likelihood of the rods being intimately connected with any of the other retinal functions, and on the assumption that they nevertheless are end-organs of some kind. In the first place, it cannot be denied that their arrangement is suitable; the number over a given area increases as we pass from centre to periphery, while they do not exist at all at the centre of the retina. In this respect they are more suitably placed than the cones for which the arrangement is the exact opposite. Corresponding to this distribution an eccentric image will cover, and the light vibrations which constitute its physical basis will bring into functional activity, a relatively larger proportion of rods to cones the more peripheral the image is. The afferent stimulus might therefore, from the mere summation of the impressions received by each individual end-organ, be greater relatively to the size and luminosity of the retinal image the more peripheral the image. This possibility, at all events, is excluded for the cones by their arrangement. It is not likely, however, that there is any invariable connection between the relative number of rods stimulated and the movement elicited in response—or the passive muscular sense of projection of which we are conscious when no movement takes place. Indeed, it is almost certain that there is not, because of the possibility of what may be called *abnormal projection.*

Under normal conditions, the constant habit of maintaining a correct association of the two eyes leads to a projection so much in accordance with the actual relative position of objects that projection seemed to receive a complete explanation by the well-known

hypothesis of the existence of identical points on the two retinæ. The same force of habit, so soon as any abnormal association is introduced, gives rise to a projection not in accordance with the true position of objects lying eccentrically, but, on the other hand, more consistent with the degree of unwonted muscular impulse which is necessary to effect, or, it may be, only to attempt their fixation. But were this all, one might say that the reflex arrangement, whatever its nature, might still be fixed and unalterable. That this is not the case is evident from the fact that the persistence of altered conditions of association of the eyes may give rise to a new and altogether different projection—one more in accordance with the new relative position of the faultily directed eye; in other words, a new habit may be acquired.

But this fact of the possibility of a new projection being acquired after some time appears to me to point more forcibly to the existence of some other reflex end-organ in the retina than the cone—presumably the rod. The reason for this is that in the matter of projection the centre of the retina may sometimes be found to act differently from the peripheral portions. This was long ago pointed out by Javal. It is well seen in the diplopia which sometimes follows tenotomy for convergent strabismus. It is not an uncommon thing to find after tenotomy of the internus (and a similar result may follow operations for divergence) that, notwithstanding the continuance of more or less convergence, there is crossed diplopia, which is either spontaneously complained of or easily elicited by suitable tests, and yet there may be found to be a great tendency to project the images of two objects falling one on one fovea and the other on the fovea of the other eye, in such a manner that they appear to occupy much the same position in space. The nerve connection of the central cones being different from that of some, at all events, of the end-organs of the peripheral

parts of the retina, the altered relative position of the eyes does not always affect central projection in the same manner as it does eccentric projection. This, of course, is no proof that the rods are, as I have suggested, end-organs for projection, etc. Yet, as it seems probable that the peripheral cones have in other respects the same function as the central ones—with respect, that is to say, to their participation in the mechanism of the form and colour senses, and the starting of afferent stimuli which lead to pupillary contraction—it appears unlikely that they should differ from the central ones in respect to their connection with the reflex centres for ocular movements and projection, even although the difference in their position renders a difference in the latter respect possible.

There are other circumstances in connection with vision which make the existence of reflex end-organs for fixation and projection probable, and which are also suggestive, as it appears to me, of the rods being end-organs of that nature. One of them may just be mentioned, viz.: the very wonderful appreciation that one has of the movement of objects seen indirectly. The whole question raised by the preceding remarks is necessarily so hypothetical, and, indeed, metaphysical, that some apology is almost called for, for introducing it at all in this journal. It is, however, I venture to think, hardly more hypothetical than the various colour-sense theories which form interesting matter for speculation, and is moreover not meant to be anything beyond a suggestion.

A. Natanson (Dorpat). Glaucoma in Aphakial Eyes. *Inaugural Dissertation, Mattiesen, Dorpat*, 1889.

The author of this paper has collected records of twenty-eight cases of glaucoma following extraction of senile cataract. To these he adds nine others, recorded partly from his own observation and partly from the registers in the Eye Hospital of St. Petersburg. He analyses this material with regard to various important points, and refers also to the allied subject of glaucoma following discission and reclination of cataract and secondary operations on the capsule ; also to glaucoma in connection with traumatic aniridia and aphakia, and congenital coloboma and absence of the iris.

In common with most ophthalmologists, Natanson regards glaucoma as essentially dependent upon an excess of pressure in the eye. The frequency of the condition after extraction of senile cataract is considerably greater, he thinks, than is indicated by the scanty literature on the subject.

The interval of time between the operation and the onset of the glaucoma varies greatly ; it was only one day in a case related by Von Græfe, eleven years in one by Brailey. According to the length of this period, the author divides his cases into two main groups :—

Group 1.—In these cases, twenty-six in number, the glaucoma made its appearance during the period of the after-treatment, *i.e.*, during the first few weeks or months after the operation. In some instances the patients were discharged in a satisfactory condition, and returned shortly afterwards with a glaucomatous complication ; in others they were not seen till long afterwards, when the glaucoma was already far advanced, but the history showed that it had begun soon after their discharge.

Complications antecedent to the operation were noted in only four cases, viz., synechia posterior (twice), keratitis, and traumatic dislocation of the lens ; and in two, at least, of these there was nothing abnormal in the healing process, or in the visual result first obtained.

The operations were of the following kinds :—Without iridectomy — flap operation, 2. With iridectomy — Von Græfe's peripheral incision, 4 ; incision at corneal margin, 9 ; incision in cornea, 2 ; incision not noted, 4 ; extraction in capsule, 2. In three cases the iridectomy was preliminary.

The abnormalities of the healing, and during treatment, were the following :—Profuse secondary hæmorrhage, 1 ; suppuration of the cornea, 2 ; incarceration of the iris, 6 ; iritis, 6 ; occlusion of the pupil, 2 ; iridocyclitis, 2 ; prolapse of the iris, 2 ; incarceration of capsule, 1 ; swelling of cortical remnants, 1. Normal healing was noted in eight cases. Glaucoma was present in the fellow-eye at the time of the extraction in one case.

The type of the glaucoma was, in the majority of cases, the acute or sub-acute.

The course of the complication was, in general, as follows :—During the first few days no decided departure from the usual state of things was noticed ; then more or less pain and inflammation occurred ; the vision was bad in proportion to the interval of time since the operation, and the tension was found to be increased. In some cases these complications appeared after complete recovery with good vision had taken place. Typical contraction of the visual field was noted in some instances.

The prognosis appears to be good when there is no considerable entanglement of the iris or capsule.

Treatment by myotics and other therapeutic measures was rarely of much use. In most cases operative treatment was necessary. Excision of the operated eye for sympathetic mischief was necessary in two cases, and for relief of pain in two others. Iridectomy was employed in two cases with good result, in four with slight benefit, and in one with none ; sclerotomy in one very advanced case gave little result.

Group 2.—In these cases, eight in number, the glaucoma made its first appearance several years after the extraction.

Complication antecedent to the operation was noted in only one case, viz., synechia posterior.

The operations were of the following kinds :—Without iridectomy—flap, 3 ; linear extraction, 2. With iridectomy

—peripheral linear, 1; incision at corneal margin, 1; incision in cornea, 1.

Complications after operation:—Iritis, 1; incarceration of iris, 1.

After-operation:—Discission of capsular membrane, 2; iridectomy for closed pupil, 1.

The type of the glaucoma was simple in four cases, acute in two, chronic inflammatory in two, and absolute in three.

In one instance the glaucoma was attributed to an injury followed by iritis.

In the majority of cases remnants of the lens or capsule were visible, but the iris appeared to be free from adhesions. The fellow eye presented glaucoma in one case; aphakia without glaucoma in three (all young persons); aphakia and glaucoma in two.

The course of the disease in this group of cases was essentially the same as that of primary glaucoma of the ordinary kind, and usually of the chronic type with typical contraction of the field of vision and cupping of disc. The anterior chamber was sometimes deep, as in most aphakial eyes, sometimes very shallow.

Iridectomy was performed in several cases, but once only with good result.

The foregoing analysis shows that in the cases placed in group 1 structural complications—entanglements of iris or capsule—to which the glaucoma might be attributed, were almost always present. What is the explanation of the cases in group 2, in which no such complications were visible? Becker examined with the microscope 38 eyes from which cataracts had been extracted. In only one-third of these was the iris free from adhesion with the scar, although 32 of the 38 eyes were removed, not on account of any trouble during life, but after the death of the patients. He specially states that minute adhesions of the iris or capsule with the scar may be quite undiscoverable in the living eye. This suggests the probability that such complications may originate the glaucoma even in eyes which appear to be free from them. On the other hand, at present we have no right to assume that primary

glaucoma does not occur in aphakial eyes quite independently of any changes produced by the operation. The supposition that it does so gains support from those cases in which it occurs in both eyes ; in two of the recorded cases both eyes were aphakial and both became glaucomatous ; in one instance one eye only was aphakial, but both became glaucomatous.

From the cases here collated one practical point is manifest, namely, that an iridectomy in cataract operations, even though large and peripheral, does not protect the eye from subsequent glaucoma. It is evident that an iridectomy performed on an eye of normal tension has not the same consequences in relation to the filtration passages, as a similar operation performed during the glaucomatous state. The author summarises his essay as follows :—

1. Neither the absence of the lens, nor the presence of a congenital or artificial coloboma of the iris, nor even a complete absence of the iris, give immunity from glaucoma.

2. So long as its continuity and normal position are maintained, the lens plays a very subordinate part, if any, in the pathology of glaucoma.

3. The occurrence of glaucoma after cataract extraction is not so uncommon as has hitherto been supposed.

4. Glaucoma after cataract extraction is usually a secondary glaucoma induced by :—hæmorrhage ; iritis ; prolapse or adhesion of the iris in the cicatrix of the wound ; incarceration of the capsule in the wound ; or swelling of remnants of the cortex. It is usually of the inflammatory type.

5. The complication may follow any method of extraction, but it is probable that a well-performed iridectomy lessens the liability to subsequent glaucoma, and lessens its severity should it occur. The danger of glacomatous complications is therefore a reason for retaining the combined operation.

6. Glaucoma occurring in the aphakial eyes of elderly persons, in the absence of complications, must be regarded as primary.

P. S.

ALFRED GRÆFE (Halle). The Position of the Eyes during Interruption of Binocular Vision. *Arch. f. Ophthal., XXXV.* 1. *p.* 137.

ED. LANDOLT (Paris). A Reply to Græfe's Article. *Ibid. XXXV.* 3., *p.* 265.

ALFRED GRÆFE. (Halle.) The Convergence Factors. A Reply to Landolt. *Ibid. XXXV.* 4. *p.* 332.

Græfe has already pointed out the insufficiency of the only two hitherto recognised factors to account for the position assumed by the eyes when one of them is excluded from vision, and he returns to the subject in the above article in order to clear his views from the doubts thrown upon them by Landolt at the International Congress at Copenhagen in 1884.

The recognised factors are the tendency to fusion and the sensation of accommodation. These cannot account for the covered eye remaining correctly fixed when a myope looks at an object beyond his far point, or a presbyope at one inside his near point. A third factor, which Græfe terms the feeling of convergence, must come in to determine the position of the covered eye in these examples, and this feeling is probably an empirical derivative of the continued action of the other two. Græfe admits his terminology may be inadequate or misleading, and is willing to adopt Hansen's "Consciousness of Nearness" (Nahebewusstsein) as a better expression, but asserts that the existence of some such factor must be assumed to account for the phenomena. The character of the circles of diffusion perceived in the examples given will not account for the correct fixation of the excluded eyes, for giving the myope a concave glass or the presbyope a convex glass makes no difference in its correctness.

Besides, in atropine mydriasis and cycloplegia we frequently find a similar correct fixation in the excluded eye. In some cases it squints inwards, and these are accounted for by the increased impulse to accommodate induced by

the paralysis ; but in many cases the excluded eye still fixes correctly.

The phenomena observed in anisometropes who possess good binocular vision are peculiarly interesting. (1.) Each eye when excluded deviates sideways, but the amount of the deviation differs in the two eyes. (2.) The excluded eye fixes correctly. (3.) Each eye when excluded exhibits an exactly corresponding deviation. The first case may be referred to the law that the eye of weaker refraction tends to diverge during exclusion more than the eye of stronger refraction. In this is seen the influence of the unequal amount of accommodation necessitated in the two eyes by the inequality of the refraction. The second phenomenon shows that some factor must be present which checks the influence of the feeling of accommodation, and keeps the excluded eye correctly fixed in spite of the tendency that the latter exercises to displace it. This is what Græfe terms the "feeling of convergence" (convergenzgefühl). The above phenomena can be seen in emmetropes also made artificially anisometropic by a concave glass. The third phenomenon is probably due to an excess of power in either the external or internal recti, and has no direct relation to the question which is discussed in the present paper.

Landolt denies the existence of Græfe's feeling of convergence for the following reasons :—To see a point in space correctly a knowledge both of its direction and its distance is necessary. The direction is given by a single eye ; the determination of the distance requires two, when any error is at once shown by the sensation of diplopia. If one eye be excluded, it is only the association between accommodation and convergence that enables the excluded eye to fix correctly. This association is close enough to account for correct fixation in most or many cases, but it is not surprising that it frequently fails, the knowledge of distance obtained by accommodation alone being only approximate, as has been known for ages. What means are left for one eye singly to estimate distance if, as Græfe assumes, the effect of accommodation is excluded ? Græfe at first supposed that the one eye communicates its feeling of convergence to the other

eye, but he subsequently dropped this term and took up Hansen's consciousness of nearness—a very different conception, according to Landolt. This merely means that when the subject is told to fix some object like the observer's finger, he knows that it lies somewhere near, and he naturally converges ; but this convergence is not to be regarded as correct fixation. The contrary has been proved by Fick's experiments, and can easily be shown by the following simple test :—Place a coloured glass before one of the eyes of a person whose accommodation is paralysed and cover it with a screen. Let him then fix with the other eye a small point of light in a dark room, and then suddenly remove the screen. If the excluded eye is fixing correctly, the light will be instantly seen binocularly, but the contrary is found to be the fact.

Græfe replies to Landolt by describing the tests to which he submitted the persons in whom he was able to demonstrate the existence of a feeling of convergence. They were directed to fix an object, such as a lamp, a number, or a letter, large enough to be plainly seen without correct accommodation. This object was placed at various unknown distances, all exterior to the range of their accommodation (in paralysis of accommodation both near and far, in myopes beyond their far point, in presbyopes nearer than their near point). One eye was covered, and the observer noted whether any motion of it took place when it was uncovered and the second eye in its turn covered. A motion equal to the effect of a prism of 2° can easily be detected by this manner of testing. Græfe still holds by the feeling of convergence, and cites Fick's experiments in favour of his views.

J. B. S.

H. MAGNUS (Breslau.) The History of Irrigation of the Anterior Chamber. *Arch. f. Ophthal. XXXIV. 2, p.* 267.

It has been frequently stated of late that the practice of irrigating the anterior chamber during operations for the removal of cataract is an old proceeding long since abandoned. Magnus, in the above paper, gives a short account of the growth and decay of the practice.

The first mention of washing out the anterior chamber seems to have been made by St. Yves (1730). The suggestion indeed could not have been made much before his time, as the older ophthalmologists believed that the lens was the light-perceiving portion of the eye, and that it was nourished by the aqueous humour, which latter, once lost, could not be reformed ; and it was not until the commencement of the eighteenth century that these views were overthrown.

The washing out was performed for three main ends : 1st, To carry off the products of inflammation, as in hypopyon (St. Yves) ; 2nd, To clear out cortical remains after cataract extraction (Guerin, Sommer) ; 3rd, To restore the curvature of a collapsed cornea after cataract extraction (Maunoir). Some ill-defined therapeutical effects were also aimed at by the addition of drugs to the water used.

Washing out the chamber after cataract extraction was suggested soon after the discovery of that operation by Daviel in the latter half of the eighteenth century. At first any syringe was used, but later Forlenze (1799) tried to improve and systematise the proceeding by using a graduated syringe, so that only 4 grammes of water should be injected, and thus the danger of rupturing the anterior or posterior chamber avoided ; he advised that the instrument should be blunt-pointed, and that clean water at blood heat, unmixed with egg albumen or other material, should be used.

For restoring the corneal curvature, the operation seems to have been done only by Maunoir, who worked without a syringe by opening the lips of the corneal wound. For clearing out pus the method soon fell into disuse when it

was found that after the escape of the aqueous the hypopyon disappeared, and Janin (1788) even condemned the practice as useless and harmful. For clearing out cortex, however, after cataract extraction, the proceeding was much in vogue in the latter part of the eighteenth century. Feller (1782) mentions that Casaamata employed it, and, as it was by wandering surgeons like him that the operation of cataract extraction was mainly performed and taught, the fact of his doing so shows that it was widely known. Arnemann (1801) also recommends it. However, in the beginning of the nineteenth century the practice died out. Beer, a leading operator of his time, does not mention it, nor do the text-books of that date for the most part; and Benedict (1824), Pauli (1838), Himly (1843), strongly condemn it. Latterly the proceeding has been revived, with what fate Professor Magnus does not venture to foretell. The above citations prove that it was a common practice in the earlier part of this century.

J. B. S.

SCHNELLER (Danzig). The Effect of Muscular Action on the Shape of the Eyeball. *Archiv. f. Ophthal. XXXV. 1., p.* 76.

It is admitted by all that external pressure can alter the shape of the globe. Schneller has found a slight pressure by the finger to produce from 0·5 to 1·25 D. of myopia when examining young eyes by the erect ophthalmoscopic image without producing arterial pulsation. By the same means he can increase his own refraction 0·5 D., and he attributes this increase generally to an increase in the antero-posterior diameter. In pathologically softened eyes the effects of muscular action are evident enough, as also in eyes with weak spots in the external tunic; but the question Schneller proposes to examine is, whether muscular action can alter the shape of eyes with normal tension. There are anatomical observations by Stilling in support of this view.

Schneller assumes that the pressure remains below that

of glaucoma, and that its effects depend chiefly upon the elasticity of the sclerotic, upon which point he refers to Schulten's experiments (*vide O.R. III.*, 370, and *IV.*, 50).

Supposing the eyeball to be a sphere, a given compression of its equator would require an increase of nearly double the amount in its antero-posterior diameter if its volume is not diminished.

The first question to decide is :—Can muscular action increase the refraction, viz., by increasing the antero-posterior diameter? This question has been long ago decided in the negative by Helmholtz and Donders; but Förster found considerable power of accommodation in young eyes from which the lenses had been extracted. Donders subsequently showed that Förster's observations were not conclusive, and the supposed accommodation was only apparent, due to the power of seeing in spite of circles of diffusion.

Schneller returns to this investigation, and cites two cases already published by him in Græfe's Archives, where an approximation of the near point was observed in aphakic eyes when the visual lines were directed downwards and inwards. He adds two cases of myopic eyes which exhibited an increased refraction of from 1·2 D. to 1·55 D. when the visual lines were directed downwards and inwards, although the eyes were fully under the influence of atropine.

In order to obviate the fallacies to which the above observations are exposed, Schneller tested a number of persons with an apparatus modified from that used by Donders. The subjects were school children between the ages of 12 and 19, and their eyes were fully atropinised. Of two hypermetropes only one showed accommodative power, and that to the extent of 0·5 D. Of four emmetropes, one exhibited no accommodation, and the other three a power varying from 1·09 D. to 2·3 D.

J. B. S.

H. Gifford (Omaha), Visible Embolus of a Branch of the Retinal Artery. Recovery under Massage and Nitrite of Amyl. *Journal of the American Medical Association, April 12th*, 1890.

A man, aged 29, with chronic purulent otitis on the right side, and somewhat run down with overwork, but otherwise healthy ; while eating breakfast, suffered from sudden blindness of the right eye. In a few moments, on rubbing the eye and applying hot water, the lower part of the field cleared somewhat. Gifford saw him in about half an hour. He found the lower branch of the retinal artery filled with a dull yellowish white plug, from a point just back of the surface of the disc to about one millimetre beyond its border. The calibre of the vessel appeared normal throughout, but beyond this obstruction it had the colour of a vein. A rough test of the field showed the absence of the entire upper half and of the contiguous twenty or thirty degrees at the nasal side.

The eye-ball was subjected to massage for two or three minutes, without immediate effect ; and the patient directed to repeat the massage every half hour, and to inhale five minims of nitrite of amyl every three hours. At the end of seven hours the whitish plug had disappeared, and all the arteries looked normal with the possible exception of a slight thickening at one point of the wall of the lower branch, which might have been an adherent remnant of the plug. The field of vision was entirely restored in about 50° at the temporal side, the remainder of the upper half lacked about 10° to 20° of the periphery, and inside of this was a zone about 20° wide in which objects were seen dimly, while the upper nasal quadrant presented a sector-like scotoma with a very irregular border at the temporal side, reaching down close to the point of fixation. $V = \frac{20}{30}$.

The next afternoon the retinal arteries appeared normal throughout, but the characteristic œdema of the retina was well marked toward the centre of the fundus, in the temporal three-fourths of the lower half of the retina. At the end of two months the fundus appeared normal ; the nasal two-

thirds of the upper half of the field was contracted about 10° at the periphery and showed two small scotomata in the nasal quadrant with -0.50 cy. axis 180, $V = \frac{20}{20}$ in each eye.

The disappearance of the plug is only to be accounted for on the supposition that it was broken up and carried into the smaller vessels, and the sector of blindness and subsequent scotomata also point in this direction. A plug so friable could hardly be fibrinous. As to the supposition that it was composed of leucocytes, Gifford finds it hard to imagine where such a clump of leucocytes could have originated in a healthy young person. He suggests that the embolus may have been composed of fat. Its appearance and friability would both accord with such composition.

The case reported by Mules (*O. R.* 1888, p. 245) was the first of displacement of a visible embolus and restoration of vision by massage ; but with the present experience we must regard resort to such measures the proper treatment for such cases, and disregard the advice of Mauthner, to wait some time for spontaneous recovery, in the fear of more firmly fixing the obstruction by manipulation.

E. J.

S. C. AYRES (Cincinnati). **Tumours of the Optic Nerve, with Report of Two Original Cases.** *Journal of the American Medical Association*, *March 8th*, 1890.

The first original case was that of a boy aged twelve, brought with a history of amblyopia of a few months' standing. He had perception of shadows. There was slight exophthalmos. The tension was subnormal, the media clear, there was well-marked optic neuritis. A few months later vision had improved to counting fingers at five feet, but there was evidence of commencing optic atrophy.

Eighteen months later he returned with proptosis, motility of the eye not impaired, optic atrophy, and entire obliteration of vision. A firm somewhat elastic tumour could be felt in the upper and outer portion of the orbit. The tumour was removed with the eye-ball. It was found spindle-shaped,

28 mm. long, and 20 mm. in diameter at the thickest portion. It was solid, and histologically proved to be a round-celled myxosarcoma. It appeared to have originated from the sheath of the nerves. The tissue of the nerve itself had undergone degenerative changes, but lay in the centre of the new growth, quite isolated from it by the much thickened pial sheath. In the year that had elapsed since its removal there had been no sign of return of new growth.

The second case was that of a girl, who at the age of eight fell on the ice, striking the back of her head, causing brief insensibility, and tenderness in the back of the head that continued for three months. Two years after this she had an attack of malarial fever, with swelling of the lids, and while testing her vision discovered that her right eye was nearly blind. She was first seen by Ayres seven years after the accident. At that time vision in the right eye was *nil*, there was optic atrophy, the eye-ball was slightly prominent and slightly divergent, but free from pain. From this time she was seen occasionally until the tumour was removed nine years later. Shooting pain was occasionally felt in the orbit, increasing toward the latter part of the period. The prominence of the eye increased gradually until it stood 7 mm. in advance of its fellow ; but its motions in all directions remained perfect ; and it was impossible to detect any tumour by pressing the finger between the walls of the orbit and the globe.

The tumour was removed with the globe. It was found firmly adherent to the apex of the orbit, but with some difficulty was removed entirely, leaving the wall of the orbit smooth. The patient recovered from the operation, but died of typhoid fever about six weeks later. The tumour was irregularly pyramidal in shape, the base having been attached to the inner wall of the orbit. The base measured 25 mm. by 14 mm., the long side of the pyramid measured 40 mm., the short side 20 mm. Histologically it was a small spindle-cell myxosarcoma. At the centre the cells were arranged in whorls, and the centre of each whorl was found to be a degenerated axis cylinder of a nerve fibre ; by being thus spread apart the nerve fibres were made to occupy a space in diameter more than four times that of the normal

optic nerve. The pial sheath of the nerve was lost in the growth, but the firm capsule which invested it was continuous with the dural sheath. For the distance of 8 mm. back of the globe the optic nerve was not at all involved in the growth.

Ayres also collects four cases, two reported by Frothingham, and one each by Aub and Lawson, adding these with his own to the 61 previously collected by Wolfheim, making 67, of which 55 were sarcomatous. These tumours occur in young persons, may be congenital, or of traumatic origin, usually affect one eye, are often of very slow growth. The first and most constant symptom is exophthalmos, developing slowly without pain or impairment of the motility of the eye-ball, but with amaurosis.

E. J.

W. Feilchenfeld (Danzig). Refractive Changes in the Eyes of Youths and Adults, *Archiv. f. Ophthal., XXXV. 1, p.* 112.

The above paper is a statistical *resumé* of the refractive changes observed in various persons who were examined at Schneller's clinique during the last eighteen years, and whose refraction had been tested at various times.

Of 125 boys (146 eyes) under the age of 20, the refraction increased in 52·44 %, remained stationary in 23·98 %, and diminished in 23·58 %.

The original refraction in 22 of these eyes was E, of which 59·09 % increased and 9·09 % diminished. Of 142 eyes with M., 61·27 % increased, 14·79 % diminished. Of 44 eyes with H., 34·09 % increased, 40·91 % diminished. Of 38 eyes with As., 33·84 % increased, 44·74 % diminished.

Of 91 girls (179 eyes) under the age of 20, 55·31 % showed an increase, 23·46 % a decrease in refraction. Of 24 of these eyes with original E., 25 % increased and 33·33 % diminished. Of 99 with M., 71·72 % increased and 14·14 % diminished. Of 24 with H., 8·33 % increased and 50 % diminished. Of 32 with As., 62·5 % increased and 25 % diminished.

In the eyes (284) of 157 men above the age of 20, the refraction increased in 26.05 % and diminished in 35·92 %. Of 55 eyes with E., 10·91 % increased, 40 % diminished. Of 104 with M., 37·5 % increased and 25·96 % diminished. Of 97 eyes with H., 25·77 % increased and 39·18 % diminished. Of 28 with As., 14·29 % increased and 53·57 % diminished.

In 556 eyes of women above 20, 19·42 % showed an increase, and 38·49 % a decrease in refraction. Of 88 eyes with E., 7·95 % increased, 37·5 % diminished. Of 152 eyes with M., 34·21 % increased, 22·37 % diminished. Of 291 eyes with H., 13·75 % increased, 46·74 % diminished. Of 25 eyes with As., 36 % increased, 44 % diminished.

The influence of incipient cataract upon refraction was seen in 48 male eyes, of whom 31·25 % showed an increase and 31·25 % a decrease. In 151 female eyes, 22·52 % showed an increase and 35·76 % a decrease.

Feilchenfeld concludes that in youth there is a general tendency to a refractive increase, most marked in M., but found also in E. and H. That in adult life refraction tends to remain stationary, but a decrease is very common. That an increase often accompanies incipient cataract, but the effect of the latter upon refraction is neither definite nor regular.

In four anisometropes (M. in one with E or H. in second eye) accommodation was shown of from 0·67 to 1·97 D.

In eight myopes accommodation varied from 0 (one case) to 2·2 D.

Schneller concludes that, in spite of the small number of the observations and the coarse character of the test objects, it may be asserted that youthful eyes possess an accommodative power of from 0·5 to 2 D., quite apart from the action of their ciliary muscles, which were fully paralysed, and not due to any change in the corneal curvature, therefore due to an increase in the antero-posterior diameter of the globe.

The curvature of the cornea has not been found altered in accommodation, and only slightly in glaucomatous conditions. V. Reuss has observed an increased corneal curvature under the influence of eserine.

Schneller has now tested atropinised eyes (using a modification of Helmholtz's ophthalmometer), and found that in

21 eyes of young persons (under atropine) five showed a measurable increase in the radius of the corneal curvature on looking downwards and inwards, seven showed a slight increase, and nine exhibited no change.

He concludes that, in young eyes, the external muscles have the power of altering the shape of the globe so as to elongate the antero-posterior axis (the principal effect being probably produced at the posterior pole), and to flatten the cornea.

J. B. S.

E. MENDEL. Reflex Immobility of the Pupil. *Deutsche Med. Wochensh.*, 1889. *No.* 47.

Mendel gives in this paper an account of his researches regarding the centre for the pupillary light reflex. Following Gudden's plan, he removed the iris by multiple iridectomies from the eyes of newly-born dogs, cats, and rabbits. The animals were killed after an interval of some months, and the brain carefully examined for degenerative changes in the path of the visual impressions. Mendel regularly found atrophy of the ganglion habenulæ of the same side as the operated eye. This structure appeared smaller than its fellow, and its cells were stunted and sparse. The ganglion is situated in the hinder wall of the third ventricle, close to the posterior commissure, in that part in which Bechterew, Hensen, Volkers, and Christiani, have localised the centre for the sphincter of the iris.

According to Darkschewitsch, the pupillary fibres of the optic tract pass to the pineal gland, and the ganglion habenulæ; and the ganglion may, therefore, be looked upon as a reflex centre for the pupillary movements. Mendel found also in two instances an evident atrophy of Gudden's nucleus. He considers that the path of the pupillary light reflex is, optic nerve, optic tract to the ganglion habenulæ of the same side; thence by way of the posterior commissure to Gudden's nucleus, and from this to the fibres of the oculo-motor nerve.

J. B. L.

SYME (Melbourne). The Ocular Manifestations of late Hereditary Syphilis. *Transactions Intercol. Med. Congress of Australasia, Melbourne*, 1889.

In a short paper based on the analysis of over 100 cases of various eye affections, presumably due to hereditary syphilis, Syme discusses some of the questions in this connection which are yet unsettled. He holds that Hutchinson's opinion that interstitial keratitis is always due to syphilis is more correct than that of many French authorities, who believe it to be a trophic lesion which may be due to several causes, syphilis being the cause generally but not exclusively. Syme says, " Keratitis need not always be due to an inherited taint, however, and some of the cases referred to have been rejected because there was a probability that they were due to acquired syphilis." He would do well to publish his cases of interstitial keratitis in which there was good evidence of acquired syphilis as a cause, for according to all authors they are exceedingly uncommon.

Of 54 cases of interstitial keratitis in which it was possible to decide as to the presence of choroiditis, in 47 this condition was found. Of these 47 patients, 21 were under the age of 12 and 10 under the age of 9 years.

Which of the tissues of the eye appears to be most often affected by hereditary syphilis? Upon this point Syme's cases do not help much. He concludes that the cornea, iris, and choroid are all affected in the majority of cases. Are these structures affected simultaneously, or if not in what order are they affected ? The author is of opinion that " in by far the majority of cases keratitis, iritis, and choroiditis occur pretty much about the same time." In a certain number of his patients he found ophthalmoscopic evidence of *old* choroidal disease, at a time when the corneal mischief was just beginning. In what proportion of cases this relation obtains is as yet undetermined. J. B. L.

Frank A. Morrison (Indianapolis) Artificial Attachment of a Detached Iris. *Weekly Medical Review, March* 8, 1890.

In a man, aged 50, it was found, some days after cataract extraction by the Græfe method, that about one-fourth of the iris had been torn loose at its periphery, and, falling across the pupil, had attached itself to the opposite side of the pupil, and completely occluded this opening. To avoid the need of excising this piece of iris, a paracentisis needle was entered just back of the sclero-corneal junction, at the point where the angle of the coloboma should have been, or where the detachment of the iris commenced. Through the incision thus made a cystitome was passed across the anterior chamber, and with its cutting edge the adhesions of the displaced portion of the iris were divided. Then, withdrawing the cystitome, a Tyrrell's sharp hook was pushed along the posterior surface of the iris, and made to seize the angle of the junction of the detached ciliary margin and the coloboma. This angle was then drawn into the lips of the corneal incision, where it was held securely by the approximation of the lips of the wound. Very little reaction followed, and the result was a complete restoration of the iris and pupil to their proper shape. The operation offers a valuable alternative to iridectomy in cases like this, and is worth considering in some other instances of irido-dialysis.

E. J.

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THE SURGICAL TREATMENT OF FIXED MEMBRANOUS OPACITIES IN THE VITREOUS HUMOUR.

By Charles Stedman Bull, M.D., of New York.

At a meeting of the American Ophthalmological Society, held in July, 1888, the writer presented a paper upon the "Surgical Treatment of Fixed Membranous Opacities in the Vitreous Humour," which was published in the Transactions of the Society for that year. (See *O.R.*, Sept., 1888, page 277.) The paper was based upon his experience in seventeen cases. His attention was first called to the subject by a short article by Von Græfe, which appeared as long ago as 1863. (See *Archiv. f. Ophthalmologie*, IX., part 2, page 102.) This article attracted no attention, and since then almost nothing has been published on the subject till the writer's paper in 1888, though the matter has been referred to by Bergmeister in 1874. (See *Archiv. f. Ophthalmologie*, XX., part 2, page 95.)

Membranous opacities in the vitreous may be conveniently divided into two groups, floating opacities and fixed opacities; and the latter alone form the subject of this paper. It is a well-recognised fact that fixed, membranous opacities in the vitreous, of whatever nature or origin, are, in the majority of cases, adherent or attached at two or more points to some one of the interior parts or coats of the eyeball, such as the choroid, retina, or optic disc, and indirectly also sometimes to the

ciliary processes. In addition, in cases of perforating wounds of the eyeball, these vitreous opacities are sometimes found adherent to the posterior capsule of the lens.

It is a matter of experience with most ophthalmologists that these fixed, membranous opacities in the vitreous, no matter how delicate or diaphanous they may be, resist all internal medication or local applications, even though persisted in for a long time. Much has been claimed for the beneficent action of the galvanic current in promoting the absorption of these fixed, membranous opacities, but the writer has seen no such favourable results from any form of the electric current employed in their treatment. It is undoubtedly true that the galvanic current does promote the absorption of the fine, dust-like or punctate opacities in the vitreous to a limited degree, and it is probable that most, if not all, of the reported cases of absorption of vitreous opacities through the medium of the galvanic current locally applied, have been cases of these dust-like opacities, and not cases of true fixed, membranous opacities.

There are some opacities of the vitreous, such as are seen after minute hæmorrhages or circumscribed inflammatory processes in the choroid, which naturally undergo absorption, especially in young persons, and disappear wholly or in part; but fixed, membranous opacities, particularly in patients beyond middle life, resist all medication or local applications in certain instances, and are proper cases for the knife of the ophthalmic surgeon. These fixed opacities materially affect the visual acuity of an eye, even when they are mere diaphanous cobwebs. A slight laceration of such a membrane with a fine needle frequently causes it to gape widely in the centre, especially if it is at all tense, and the improvement in vision is sometimes very marked. In the case reported by Von Græfe occurring in a young woman aged 19, the ophthalmoscope

showed a retraction of the membrane from the centre towards the periphery, and a subsequent total absorption of the entire membrane, so that ten months after the operation not the slightest trace of the opacity could be discovered in the vitreous.

Besides materially affecting the vision, these opacities, if at all dense, become still more dangerous to the functions of the eye by reason of their traction on the retina at their points of adhesion. This danger is greater if the membrane is dense and stretches across the vitreous in a lateral or vertical direction, than if it runs fore and aft through the vitreous. The gross pathology of many an enucleated eyeball has taught us the ever present danger of detachment of the retina, and even of the choroid, by the contraction of dense membranous bands in the vitreous. If we succeed in dividing such a membrane, we may not only materially improve the vision, but may also incite an absorptive process in the eye, which may bring about a disappearance, more or less complete, of the membrane, as was proved in the case reported by Von Græfe ; and, by thus reducing the tension in the membrane, lessen the chance of occurrence of a retinal detachment.

The position of a membrane in the vitreous of course varies within tolerably wide limits. If the cause has been a perforating wound of the eyeball, or the rupture of a ciliary or choroidal vessel, the resulting membrane may be anywhere in the vitreous body. If the cause has been a hyalitis, the result of a chorio-retinitis, the location of the resulting opacity depends somewhat upon the position of the inflammatory process. If the choroidal inflammation has been in the region of the posterior pole, around the macula and optic disc, the infiltration into the vitreous and the resulting membranous opacity is almost certain to occur in its posterior part. If the cornea and lens remain clear, the process of transmutation from an infiltration into the vitreous to the development of a membrane may often be studied from begin-

ning to end with the ophthalmoscope. These posterior membranes are very apt to be in threads or patches which may be connected with the retina at one end and with the optic disc at the other, through the medium of adhesions to the sheath of the central vessels or to the margin of the disc itself. Where the former occurs, there is apt to be a prolongation of the central vessels into the membrane, and, in rare instances, a direct development of vessels in the membrane from offshoots of capillary vessels on the disc. The farther forward the choroidal infiltration occurs, and the nearer it is to the ciliary processes, the more anterior are the opacities of the vitreous likely to be.

The facility and thoroughness with which the operation of laceration may be done, and the possible improvement of the existing vision, depend largely upon the position of the membrane in the vitreous. If the membrane is far back in the vitreous, it is more easily reached by the knife or needle in the proposed operation, and in the hands of a skilled operator there is little risk of doing any damage to retina or optic disc, and, of course, no risk of injury to the lens. If the membrane is situated in the anterior part of the vitreous close to the lens, of course the danger of wounding the lens is much increased. As regards the improvement of vision, it may be safely said that laceration of a membrane in the middle or posterior parts of the vitreous always, or nearly always, promises improvement of the sight, provided no serious lesion of the fundus is present. If the membrane runs fore and aft through the vitreous, and especially if it is attached anteriorly to the posterior lens capsule, the chances of improving the vision are comparatively slight, though even in such cases the writer has seen decided improvement in vision following the operation, especially in eccentric vision. The method of operating in the case published by Von Græfe is thus described by him: The eyeball was rotated strongly inwards, and a keratonyxis needle was

then plunged through the sclera between the external and inferior recti muscles, just in front of the equatorial region, parallel to the plane of the iris, and behind the lens, and the membrane was then divided in several places from before backwards. Ten months after the operation not the slightest trace of the opacity could be discovered in the vitreous; eccentric vision was normal, and central vision was almost normal. Before the operation vision was reduced to counting fingers at 18 inches, and three weeks after the operation the patient could read Jaeger No. 3 with the naked eye.

The first 17 cases reported by the writer in 1888 occurred in 15 patients, and the operation gave decided improvement in the vision in 14 cases, while in 3 cases the operation was a failure. Of the 12 cases here reported, it will be noted that in 11 there was notable improvement, in one no improvement. In no case was there any loss of vision following the operation. In some of the cases the ordinary discission or keratonyxis needle was employed; in others, a broader needle with a double cutting edge; while in a few, where the membrane appeared tough and thick, a very slender cataract knife was the instrument selected. In all the 17 cases first published, and in the 12 cases since operated upon and presented in this paper, cocaine was employed as an anæsthetic.

Whenever the peculiarities of the case admitted, the point selected for the puncture was just in front of the equator of the eyeball, and just below the lower border of the external rectus muscle. In a few cases the puncture was made on the nasal side of the eyeball, just below the lower margin of the internal rectus muscle. The operation is very brief, and should be preceded and followed by an ophthalmoscopic examination.

A number of these operations were done by the light reflected from the ophthalmoscopic mirror used as a head mirror, as in laryngoscopy. No special advantage was found to be gained by this method, for, although

it proved easy to lacerate the membrane by reflected light, the forehead mirror interfered somewhat with the first step of the operation, that of puncturing the eyeball with the instrument in the spot chosen for its introduction.

In many of the cases, perhaps the majority, no fixation forceps were employed to rotate or steady the eyeball, and thus one source of irritation, the stretching and perhaps laceration of the conjunctiva, was avoided.

No loss of vitreous ever occurs through the small opening in the conjunctiva, and there is but little probability of any annoying hæmorrhage, either external or internal.

Little or no reaction follows, save in ex ceptional cases, and the instillation of atropia and the application of a protective bandage are needed but for a day or two.

The experience gained from the results in the entire number of twenty-nine cases has led the writer to a favourable conclusion as regards the value of the operation. The operation is without doubt a suitable one in certain cases, and is justified by the results obtained. If the field of vision is intact and projection good, and if the membranes in the vitreous are neither too dense nor too numerous, the operation promises almost always a fair amount of improvement in the vision, and sometimes very marked benefit. No operation should be undertaken until all signs of intra-ocular inflammation have long subsided, and until, in fact, the membrane in the vitreous has become a chronic obstruction to vision. The eye should be absolutely free from all irritation before attempting any such surgical interference.

Abstract of Cases not previously reported.

Case XVI.—Lady, aged 74.—Myopia of 9 D., with

choroidal atrophy, faint peripheral lens opacities and fixed membranous opacity of vitreous in both eyes.

R.E. V. = $\frac{18}{50}$ with sph. —9D.
L.E. V. = $\frac{18}{50}$ „ „ —10D.

April 12th, 1888. Laceration of fixed membranous opacity in R.E. by discission needle. No improvement in vision.

CASE XVII.—Boy, aged six. R.E. normal. L.E. old retinitis and hyalitis with fixed membranous opacity, crossing vitreous and covering disc. Counts fingers at one foot.

Oct. 20th, 1888. Laceration of membrane in vitreous of L.E. in two directions with double edge needle. No hæmorrhage.

Dec. 11th, 1888. L.E. $\frac{20}{200}$.

CASE XVIII.—Woman, aged 43. Origin, traumatic, bv blow two months before in L.E.; some floating blood clots in vitreous, and two fixed membranous bands running from above and outwards, downwards, inwards, and backwards. V = movements of hand. R.E. normal.

May 12th, 1889. Division of both bands in vitreous of L.E. by narrow cataract knife from above downwards.

June 10th, 1889. L.E. $\frac{20}{100}$ in infero-nasal quadrant of field.

CASE XIX.—Man, aged 49. L.E. lost 16 years ago by traumatic irido-cyclitis. V = 0.

R.E. $\frac{2}{200}$; struck by piece of coal four months before. Pupil oval; faint lens opacities at periphery. Dense membrane across centre of vitreous. Old choroiditis.

March 20th, 1889. Division of membrane in L.E. from above downwards by narrow knife.

May 1st, 1889. L.E. V = $\frac{20}{200}$.

CASE XX.—Boy, aged 11. No history, R.E. V = 0. Strabismus convergens from infancy, old chorio-retinitis, L.E. $\frac{20}{50}$. Peripheral chorio-retinitis, organised membrane extending across vitreous.

April 21st, 1889. Laceration of thin membrane in L.E. by discission needle.

May 30th, 1889. L.E. $\frac{20}{30}$.

Case XXI.—Gentleman, aged 52. Old chorio-retinitis in both eyes. Cirrhosis of liver and kidneys in hypertrophic stage. R.E. $\frac{20}{200}$. Peripheral opacities in lens, fixed membrane in vitreous.

L.E. $\frac{20}{70}$; same condition, less marked.

Oct. 14th, 1889. Laceration of fixed membrane in R.E. by double edge needle.

Oct. 21st, 1889. Laceration of fixed membrane in L.E. by double edge needle.

Jan. 13th, 1890. R.E. $\frac{20}{30}$; L.E. $\frac{20}{30}$.

Case XXII.—Lady, aged 50. Always myopic, vision has grown worse of late.

R.E. $\frac{5}{200}$ with sph. -5D. $= \frac{20}{50}$; fine cobweb in vitreous, L.E. $\frac{3}{200}$, with sph. -6D. $= \frac{2}{20}$.

Sept. 22nd, 1889. Laceration of fine cobweb in vitreous of R.E. by discission needle.

Nov. 4th, 1889. R.E. $\frac{20}{20}$.

Case XXIII.—Lady, aged 48. Fog or mist before R.E. for some months. Cause probably a hæmorrhage.

R.E. $\frac{20}{50}$; small opaque membrane in centre of vitreous.

L.E. $\frac{20}{20}$.

Oct. 5th, 1889. Laceration of membrane in R.E. with discission needle.

Dec. 3rd, 1889. R.E. $\frac{20}{30}$.

Case XXIV.—Lady, aged 40. Always myopic, with defective vision of late in R.E.

R.E. $\frac{5}{200}$ with sph. -9D. $= \frac{20}{50}$. Extensive thin membrane stretching across vitreous. L.E. $\frac{4}{200}$ with sph. -9D. $= \frac{20}{20}$.

Oct. 8th, 1889. Laceration of membrane in R.E. with discission needle.

Nov. 30th, 1889. R.E. $\frac{18}{30}$ with sph. -9D.

Case XXV.—Gentleman, aged 57. Always myopic. Of late has noticed a fixed cobweb in front of each eye.

R.E. $\frac{6}{200}$ with sph. -9D. $= \frac{20}{100}$.

L.E. $\frac{6}{200}$,, ,, -9D. $= \frac{20}{100}$.

Thin but extensive cobweb membrane in each eye.

Oct. 15th, 1889. Laceration of membrane in R.E. with double edge needle.

Oct. 28th, 1889. Laceration of membrane in L.E. with double edge needle.

Dec. 1st, 1889. R.E. $\frac{18}{50}$ with sph. -9D.
L.E. $\frac{18}{70}$ „ „ -9D.

Case XXVI.—Man, aged 19. Suddenly lost sight of R.E. in August, 1889.

R.E. $\frac{10}{200}$, fixed and floating opacities in vitreous.

Jan. 12th, 1890. Laceration by crucial incision of dense membrane in vitreous of R.E. with narrow knife.

March 4th, 1890. R.E. V. = $\frac{20}{100}$.

Case XXVII.—Woman, aged 23. R.E. $\frac{20}{40}$, failing V. for a year. L.E. $\frac{20}{100}$, old disseminate choroiditis, membrane in vitreous attached to head of disc.

Dec. 28th, 1889. Division of membrane in L.E. from above downwards with the double edge needle.

Jan. 30th, 1890. L.E. V = $\frac{20}{50}$.

A UNIT OF STRENGTH AND SYSTEM FOR NUMBERING PRISMS.

By Edward Jackson, M.D., Philadelphia.

The designation of prisms by the angular deviation they cause, instead of by the refracting angle, was urged by the writer before the Section on Ophthalmology of the Ninth International Medical Congress. The proposition was endorsed by the meeting, which appointed Drs. E. Landolt, Swan M. Burnett, and the writer, a committee to report upon the subject to the Tenth International Medical Congress. At the Seventh Periodical International Ophthalmological Congress, in 1888, Dr. Landolt advocated the change; and the same year a committee of the American Ophthalmological Society recommended it. Recently two important papers on the subject have appeared, viz.: "A New Method of Numbering Prisms," by Dr. Wm.

S. Dennett, in the *Transactions of the American Ophthalmological Society* for 1889; and "A Metric System of Numbering and Measuring Prisms," by Mr. Charles F. Prentice, in the *Archives of Ophthalmology* for January, 1890.

The original proposition was to designate a prism by the number of degrees it deflected light, passing through it in the direction of minimum deviation, that is, when refracted equally on entering and leaving the prism, and within it passing perpendicularly to the plane bisecting its refracting angle. Dr. Dennett would base the new system on the "radian," the angle whose arc is equal to radius, taking as the unit one one-hundredth of this, and calling it one CENTRAD. Each prism should be designated by the number of centrads it deflects light; passing through it, not in the direction of minimum deviation, but so that the refraction all occurs at one surface, the rays within the prism being perpendicular to the other surface. Mr. Prentice would designate the prism by its power (when in the position of refraction at a single surface) to produce linear deviation, in a plane perpendicular to the incident ray, and one metre distant from the point of refraction. The unit should be a deviation of one centimetre at the metre-plane, to be called a "PRISM-DIOPTRE," and indicated by P.-D.

All agree that the number of a prism should bear some simple, constant relation to its refractive power. In what position shall that refractive power be estimated? For the position of minimum deviation it may be urged that it is the definite position most easily determined when the prism is to be tested by holding it in the hand and observing through it the displacement it causes at a certain distance, a most ready and convenient method. The position of refraction all at one surface has in its favour that it simplifies calculations that deal with the relation of refracting angle to refractive power, and it is more readily attainable when

prisms are used in the trial frames, or tested with an apparatus specially for the purpose.

For the unit of strength, the refractive power of one degree has these advantages: the degree is the unit of angular measurement in general use in all branches of science and art, and in all countries; it is used in ophthalmology to indicate the directions of the visual axes, of cylinder axes, and of the different meridians of the cornea or field of vision; and it is not likely to be displaced from common use by any other unit. But by it the prism numbered 1 would be nearly twice as strong as the number 1 of the present system, and a complete change of number would be necessitated, and a need created for fractional numbers like the $1\frac{1}{2}$, $2\frac{1}{2}$, etc.

It will be noticed that the units proposed by Dennett and Prentice are very nearly identical, the centrad one one-hundredth of the radius measured on the arc, and the prism-dioptre, one one-hundredth of the radius measured on the tangent. For the small deviations caused by the prisms most used in practice they may be regarded as identical. But for large angles the difference is great and decidedly in favour of the angular unit as against the tangential; the use of angular units to indicate divergences being almost universal. But the strong point for such a unit is that it entails so little change in the numbers already used to designate prisms. It is practically putting our present numbering on a definite scientific basis of refractive power. The index of refraction for glass now used for spectacles averages somewhat less than 1·54; and, made of such glass, a prism of 1 degree refracting angle has 0·94 of one centrad of refractive power; while strong prisms produce more than one centrad of deviation for each degree of refracting angle.

With glass having an index of 1·54, the relations of the two systems of numbering are shown by the following table, in which the first column gives centrads of refrac-

tive power and the second the degrees of refracting angle required to produce it, when the rays within the prism pass perpendicularly to one of its surfaces.

Centrads.	Degrees.	Centrads.	Degrees.	Centrads.	Degrees.
1	1·06	9	9·39	17	16·98
2	2·12	10	10·39	18	17·85
3	3·18	11	11·37	19	18·68
4	4·23	12	12·34	20	19·45
5	5·28	13	13·29	25	23·42
6	6·32	14	14·23	30	26·81
7	7·35	15	15·16	40	32·18
8	8·38	16	16·08	50	36·03

From an inspection of the above it appears that the difference between any two prisms having the same number in their respective systems of numbering would be less than one-quarter of one degree of refractive power, until number 20 is reached, less than the inaccuracies to be found in almost every set of trial prisms now in use.

A strong point Prentice urges for the prism-dioptre, equally in favour of the centrad, is its extremely simple relation to the metre-angle. Half the distance between the pupils is the tangent of the metre-angle, the radius being one metre.

Each centimetre of such half inter-pupillary distance, being one one-hundredth of radius, corresponds to one centrad of angular deviation. Thus when the distance between the pupils is 6 cm., the metre-angle is 3 centrads. Some such simple relation to the general angular unit is needed to make the metre-angle of much practical service. The name centrad, for this unit, has here been used, because it was the first proposed, is short, significant, and distinct from any term already in use.

Schœler (Berlin). Operative Treatment and Cure of Retinal Detachment. *H. Peters, Berlin*, 1889.

This is a very interesting little book. The author devotes the first few pages to a brief review of the various methods of treatment hitherto proposed for detached retina, summing them up as all alike practically useless, the few cases in which re-attachment has occurred, having been, in his opinion, almost without exception, merely instances of spontaneous cure. Alluding shortly also to the different versions of the pathology of this disease, he draws a sharp distinction between that of inflammatory exudation occurring between retina and choroid, thus causing a separation, and the theory advanced by Leber and others that the injury is primarily due to a shrinking of the vitreous, which, as it progresses, pulls the retina forwards and eventually leads to rupture and detachment. To this latter view Schœler gives his entire adherence.

Without referring to the ordinary modes of treatment, we may confine our attention to the two specially noticed in this book, viz. : (1) that at one time practised by Galezowsky ; and (2) that now advocated by Schœler. In some respects the *modus operandi* is the same in both, but it differs in important particulars. Galezowsky, believing in the inflammatory exudation theory, has attempted to draw off the fluid between retina and choroid, and to inject iodine into the sac, *i.e.*, *behind* the retina, with the object of setting up an adhesive inflammation which shall reunite the two separated membranes. Schœler, on the other hand, injects tincture of iodine into the vitreous just in *front* of the retina, his intention being to press the latter back against the choroid, to overcome the traction forwards caused by the shrinking vitreous, and finally, as in the former case, to give rise to a plastic chorio-retinitis which shall cement the two structures together ; not believing in the inflammatory theory, he, of course, makes no attempt to aspirate. The author points out two or three essential differences in these two methods. In the former, it would seem, he says, that the injection of a fluid, and in considerable quantity too,

between the retina and choroid must, by its mere physical properties in the first instance at least, tend rather to widen than diminish the detachment ; in his own operation, however, the increased pressure, coming from the front, would have exactly the opposite effect. It is of importance to note also that in the former procedure the irritating action of the iodine comes almost directly on the rods and cones, while in the latter the membrana limitans interna and layer of nerve fibres are more immediately affected.

Previous to attempting his present operation, Schœler made many experiments on animals as to the effects of injecting irritating fluids into the vitreous. He found that they were shortly as follows : a few minutes after the injection, an acute retinitis set in, varying in intensity according to the nature and amount of fluid used ; this ran its course for the next 6, 8, or, on one occasion, 14 days, and by the end of that time all inflammation had subsided, the only obvious result being an irregular choroidal atrophy, with a large amount of deep-coloured pigmentation ; hæmorrhage in the vitreous did not once occur, but a diffuse vitreous opacity was in each instance observed, which, after reaching its maximum in 24 or 30 hours, began gradually to disappear, and in a few days finally dissolved ; no increased fluidity of vitreous was in any case detected.

Before giving notes of his cases, Schœler sums up shortly the points he aims at in his operation, viz. : (1) to produce an adhesive retinitis which shall counteract the tendency of the shrinking vitreous to pull the retina forward ; (2) in so far as possible to limit this inflammation to a degree which shall not, more than is necessary, impair the retinal function ; (3) to use a reagent whose action shall help the absorption of the fluid which has found its way behind the retina ; (4) the vitreous to be damaged as little as possible ; and (5) the agent to be antiseptic. Tincture of iodine he has found to answer these requirements, and accordingly he has employed it in all his cases. With a view to the resulting condition of the choroid and vitreous, he has also—perhaps somewhat empirically—given mercurial hypodermic injections, and has combined this treatment with enforced rest in bed (the patient lying on his back), and strict milk

diet, if possible, for two to four weeks ; during the first few days, the eyes were carefully bandaged.

For an exact description of the instruments he uses, and the steps of the operation, reference must be made to the original, but it is sufficient here to state that, after a careful selection by means of the ophthalmoscope of the spot most suited for puncture, he passes a sharply curved knife for some little distance under the conjunctiva, pierces the sclerotic as near as possible to the spot chosen, and injects, through a small tube in the instrument, from two to six drops of iodine tincture into the vitreous, just in front of the retina ; in each instance he made a rapid ophthalmoscopic examination immediately afterwards. Full notes are given of all the cases, but we cannot do more than indicate very briefly the chief points of interest.

Case I. was that of a woman, aged 40, with a very large detachment, only a small section below being still *in situ ;* in its outer periphery the retina was ruptured. As far as could be ascertained the condition had been present for eight days. V = hand movement from 1 to 2 feet in the upper part of the field only ; lower field defective ; six drops of tincture of iodine were injected, the tension of the globe rising manifestly after the first three drops ; an acute chorio-retinitis occurred almost at once, but subsided in a few days, leaving considerable patches of choroidal atrophy with irregular pigmentation ; vitreous opacity of a dark brownish colour was also noticed to follow the injection ; this however cleared up entirely ; no trace of the previous detachment could be discovered, vision improved to Sn. CC. at 14 feet, and Sn. II. at 3 inches, and the field was materially widened, although not fully restored.

Case II.—A man æt. 21, with a large flat peripheral detachment, seemingly of five weeks' duration ; fine vitreous opacities also present. V. with myopic correction = fingers at five feet and Sn. VII., words only, more guessed than read ; field defective, up and out ; four drops of tincture of iodine injected. Ophthalmoscopic examination immediately afterwards showed, that at the seat of puncture there was

now no retinal detachment ; the last note of this patient is dated exactly two months after the operation ; by that time V. had improved to Sn. C at 14 feet and Sn. II easily read ; field much improved ; here also there was complete re-attachment of the retina, but of course, as in Case I., not without considerable choroidal atrophy and irregular pigmentation being left. The vitreous opacity had entirely cleared up. It is of interest to note that in this case a posterior capsular cataract, though of moderate degree and with a clear central cleft, resulted. In two of the following cases, on the other hand, where cataract already existed, it was particularly observed that the lens opacity was not increased by the operation.

Case III.—Frau C., æt 63. Left, almost total detachment of some months' duration, numerous posterior synechiæ and vitreous opacities. Right, V. suddenly impaired, a fortnight before patient underwent treatment ; the ophthalmoscope showed in this eye peripheral detachment downwards, and especially downwards and outwards ; no rupture observed ; incipient cataract, and in the vitreous, numerous floating opacities. V = 14/200 and Sn. X. at 8 inches. Field defective, corresponding to detachment ; three to four drops of iodine tincture were injected. In this case the cure was not complete, two small bands of detachment being still apparent after all inflammation had subsided ; they were, however, considerably less prominent than before, and for the rest, complete restoration had been effected. Cataract not increased ; vitreous opacities, if anything, less than before interference : V = Sn. L. at 14 feet, Sn. 1 1/11 at 7 inches ; field considerably widened.

Case IV.—Carl Gl., æt. 22. High myopia of both, and right divergent strabismus. V = fingers at 4 feet ; no type. Large flat detachment below ; with the exception of a few folds, the retina is transparent, and no rupture is seen ; considerable choroidal changes and vitreous opacities ; tincture of iodine—two drops—injected. Although the vision materially improved, the separation was not cured, and a fresh injection of two to three drops was thrown into the vitreous

one month after the first operation ; on this occasion also the resulting inflammation was very slight, but enough to replace the retina, in its whole extent, with the exception of a small portion, downwards from the seat of puncture : V. with correction = Sn. CC at 14 feet. Sn. 1-1/11 fluently at three inches. Field, taken with the perimeter, was by daylight almost normal, but with a dimmer light somewhat contracted upwards.

CASE V.—A man æt. 66, also high myopia, and complicated with posterior polar cataract. Vitreous very fluid, and showing large flocculent opacities in each ; V = fingers at 6 inches, recognised only in the upper and outer part of field ; the rest of the field totally defective even to hand movements. Detachment complete except down and in ; T — 1 ; the impairment of vision had been present only eight days ; four drops of tincture of iodine injected. Owing to the cataract, and to a large cloudy opacity in the vitreous, very accurate ophthalmoscopic details of this case cannot be given. The retina, however, could be seen in nearly its whole extent to have regained its ordinary red colour, and the field, taken by daylight, had recovered its normal limits, except in a small portion, up and in, which corresponded to the most serious inflammatory changes, following the use of the iodine. Patient could easily tell the time, if a watch were held before him.

These cases, it is only fair to say, have not been selected with a view to brilliant results—indeed some of them were particularly unfavourable ones—but the results notwithstanding are sufficiently surprising, and go far to justify Schœler's claim, that at last a rational and scientific method of combating this disease has been attempted. Of course, the data are as yet quite insufficient to found any very definite conclusions upon, and there are many points which require further elucidation and investigation, *e.g.*, the permanency or not of the cure, the possibility of using agents other than iodine, which might, perhaps, effect the purpose equally well, and yet not so seriously injure the retina, the length of time which may elapse between

the occurrence and treatment of the injury before all hope of amelioration is gone, and many other questions which will at once present themselves to the reader's mind. It is enough here to say that the work has been begun by Schœler in a thoroughly scientific spirit, and will, we hope, be continued by him and others, until it is clearly proved whether we have indeed found a means to cope with a disease, hitherto, to all intents and purposes, beyond the bounds of practical treatment.

NORMAN M. MACLEHOSE.

ABADIE (Paris). The Pathogenesis of Sympathetic Ophthalmia and a New Method of Treatment. *Annales d'Oculistique, Mars-Avril*, 1890.

The researches of Leber and Deutschmann have, in the author's opinion, established beyond doubt that genuine sympathetic ophthalmia following a traumatic lesion is due to infection by micro-organisms. The eye may be infected at the time of infliction of the wound or subsequently. This theory, which was the outcome of experimental research, has been confirmed by, as it has itself helped to elucidate, clinical observation.

It is most rational to admit that the infection travels to the second eye by the optic nerve and chiasma and the opposite nerve.

The wounded eye becomes a pathogenic focus. The micro-organisms which have been introduced increase and multiply rapidly in tissues the vital energy of which is lowered as a result of injury.

When they have become numerous and powerful they begin to attack healthy tissues, spreading from the wound as a centre.

Clearly, if enucleation of the injured eye be performed before the microbes have begun to spread to the nerve, or, failing this, if the section of the optic nerve be made in a still uninfected part, the second eye will be saved from attack.

Moreover, if the other eye be already affected, excision of the wounded one will remove the chief focus of disease, where the development of micro-organisms is proceeding with greatest intensity. In such a case, however, this treatment alone is insufficient, and what measures should be adopted to cure the already sympathising eye?

If the microbic infection of the second eye is just beginning, the micro-organisms which have reached it will find themselves in healthy tissues, which they can with difficulty disorganise. Either phagocytes or the normal cellular elements (this point in bacteriology is still obscure) are endeavouring to destroy the invaders, and if their numbers are not reinforced from the source of infection, the chances are that the microbes will go to the wall. Such a desirable end will be greatly favoured by treatment by mercurials or other germicidal remedies.

But if, *au contraire*, enucleation of the wounded eye is practised, long after the second eye has become invaded by the micro-organisms, and its tissues enfeebled, but little chance offers for its ultimate recovery.

In such a case, any surgical interference with the sympathising eye until all morbid processes have entirely subsided appears to light up the activity of the micro-organisms and lead to still greater damage to the tissues.

Acting upon the lines here indicated, Abadie recommends the following treatment in cases of threatened or existent sympathetic inflammation; by such means he thinks that, except in such cases where the wounded eye is hopelessly destroyed, its removal may be avoided.

If the case comes early under care, strictly antiseptic treatment should be adopted, in the hope of preventing infection. If, in spite of these measures, it occurs, the wound should be carefully and thoroughly cauterised with a fine galvano-cautery, the patient being anæsthetised.

If this is insufficient, the injured eye should have injected into it one or two drops of a solution of sublimate, 1 : 1000. Such injection causes for some hours considerable reaction, which slowly subsides, and amelioration in the condition of both eyes ensues.

The author gives very incomplete notes of three cases

which he has treated in this way: (1) A woman, æt. 60, suffered from a large rupture of the sclerotic half way below the margin of the cornea and the equator of the eye; through this wound the lens escaped and into it the ciliary body prolapsed. She was seen some hours after the accident, and the wound was carefully cleansed with sublimate solution 1 : 2000, and an antiseptic dressing applied. Three weeks later the second eye became acutely affected. The wound and the prolapsed choroid were freely cauterised, and two drops of a 1 : 500 solution of sublimate injected into the eye.

Sharp reaction followed, with very severe pain. This slowly subsided, and both eyes rapidly improved. Four months later it is stated that the injured eye could see to read with + 15 D. The acuteness of vision regained by the sympathising eye is not accurately stated.

(2) Boy, æt. 14, suffering from severe sympathetic ophthalmitis following injury; vision in each eye was greatly reduced. Two drops of sublimate solution (this time 1 : 1000) were injected into the wounded eye. The reaction was much less than in the previous case, and was followed by considerable improvement in both eyes.

(3) A man with sympathetic opthalmia of the left eye, whose right eye had been removed. In spite of enucleation and mercurial inunction, the disease continued to advance, and vision became progressively worse. One drop of a 1:1000 solution of sublimate was injected into the eye, with the result of checking the disease.

The author believes that in seemingly hopeless cases, such as the last one reported by him, this method of treatment offers a better chance of saving useful vision than the means which have been heretofore advocated and employed.

J. B. L.

GAYET (LYON). Anatomical Researches in a case of Sympathetic Ophthalmia produced experimentally. *Archives d'Ophtalmologie, Mars-Avril*, 1890.

This paper contains a minute account of the conditions found by the writer in the eyeballs and optic nerves of a rabbit, in which he unintentionally produced a sympathetic ophthalmitis during the course of some experiments. Early in July, 1889, Gayet operated on a little girl for some suspicious fungoid growth in the lacrimal sac. Wishing to ascertain the nature of the growth, he introduced a small nodule into the left anterior chamber of a young rabbit, through an incision in the cornea. The lens was not wounded during this manœuvre. The animal was subsequently taken into the country and placed in the best possible hygienic surroundings. During July the inoculated eye underwent no visible change, and the nodule remained in the A. C. apparently unaltered. The rabbit grew healthily. In the last few days of the month there were signs of change, the conjunctiva became inflamed, the iris became adherent to the nodule in the A. C., and the nodule began to alter in shape.

No general symptoms ensued, however, but a month later the right eye of the rabbit, hitherto intact, became acutely inflamed, and a vascular keratitis developed. The colour of the cornea resembled boiled egg albumen ; it was furrowed from periphery to centre by a rich vascular network.

Gayet concluded that, instead of general infection such as he anticipated would follow the inoculation he had practised forty-five days previously, sympathetic inflammation had arisen in the second eye. The inoculated eye remained chronically inflamed and blind.

The rabbit was kept under observation till October 6th, during which time the symptoms in the right eye became aggravated, and two areas of infiltration appeared in the cornea at both ends of its horizontal diameter.

The animal was killed on the date mentioned, the eyeballs removed, and they and the head preserved for investigation.

The parts subjected to careful microscopic examination were (1) the left eyeball, that which had been the seat of inoculation ; (2) the left optic nerve ; (3) the chiasma ; (4) the right optic nerve ; (5) the right or sympathising eyeball.

(1) *The wounded (left) Eye.* Macroscopically :—Cornea and sclera unaltered ; ciliary processes recognisable ; iris thickened and pressed against the posterior surface of the cornea. The nodule of inoculated material had entirely disappeared. Lens swollen and much altered, only its nuclear part appeared healthy. Retina detached and folded against the lens ; sub-retinal space filled by greyish exudation ; choroid *in situ.* Microscopically :—Cornea and sclera intact ; ciliary processes and iris infiltrated with migratory cells, but not in large numbers. Walls of vessels in iris thickened. Lens, invaded throughout by round cells ; capsule almost entirely destroyed. Retina, folded and crinkled, rested in a bed of leucocytes immediately behind the lens ; it had undergone extensive changes, and its distinctive characteristics had entirely disappeared ; the sustentacular tissue was irregularly swollen and sclerosed. Choroid, anteriorly, near the ciliary processes almost unaffected ; more posteriorly in the part from which the retina was separated there were small bud-like excrescences of embryonal cells, which protruded the hexagonal pigment layer.

(2) *Left Optic Nerve.*—Sections of the proximal and peripheral portions showed an interstitial neuritis with marked inflammatory changes in the vessels.

(3) *Chiasma.*—Towards the left side very evident changes, nervous tissue scarcely recognisable ; this portion inflamed and sclerosed, containing many leucocytes. On the right side, nerve fibres plainly visible, but the nerve bundles invaded by the disease of the neighbouring half, *i.e.*, the inflammation had passed from the left nerve fibres to the right nerve fibres.

(4) *Right Optic Nerve.*—Sections made from chiasma forwards. Vascular changes as in right nerve, and other undoubted evidences of inflammation. Nerve sheath not inflamed, but accumulation of blood corpuscles in sheath space.

(5) *Right or Sympathising Eye.*—Cornea inflamed, and

containing large numbers of small cells, especially in its anterior layers; the ciliary part of the sclerotic was also infiltrated with cells; iris and ciliary body contained but few migratory cells. Choroid in its whole extent apparently healthy; retina also exhibited no changes; the vitreous contained some delicate membranous films, on which were found some blood cells. The lens showed only a colloid degeneration.

In commenting upon the conditions described, the author says:—" The disease, starting from the seat of infection in the anterior chamber of the left eye, invaded the crystalline lens, the vitreous and retina, and disorganised the latter in its whole extent; thence it extended to the optic nerve, up which it passed, making its way chiefly along the vessels. The conditions found in the chiasma leave no doubt that the inflammation passed from the left nerve fibres to those of the right; in the right optic nerve the evidences of interstitial inflammation did not reach as far as the eyeball; in the right eye itself were sclero-corneal changes. There thus appeared to be a gap in the track of the disease, and doubt as to the route along which it passed from the nerve to the anterior part of the eye. The probable path was from the nerve along the vascular channels of the suprachoroidal and episcleral circulation.

The descending inflammation also seemingly left the optic nerve by the lymphatic channels accompanying the central retinal vessels, and thus reached the nerve sheaths and the lymph spaces beneath Tenon's capsule. The anatomical changes found in this case support the idea originally suggested by Mackenzie, that the optic nerves are the tissues by which the infection travels from the exciting to the sympathising eye.

In this investigation no attempt was made to discover micro-organisms, but the author refers fully to the bacteriological researches of Deutschmann and others in connection with sympathetic ophthalmia, of which researches he speaks in terms of warm praise.

J. B. L.

Hirschberg (Berlin). Historical Studies in Egypt. *Leipzig, Georg. Thieme*, 1890.

This work contains three short articles, written after a visit to Egypt. The first treats of the climatic conditions of the different parts (upper and lower) of the country from a general point of view. The second gives an interesting account of ophthalmology among the ancient Egyptians. The third part has for its subject Egyptian ophthalmia. The author believes that this disease has existed in Egypt for centuries, and is described by very ancient writers on medical subjects. Certainly it was known before Napoleon's army invaded Egypt and acquired trachoma, among other trophies. Hirschberg gives a sufficiently doleful account of the present state of the natives as regards the prevalence of this disease, which, although not nearly so severe as in the early part of the century, is met with in large numbers of the population. He thinks the most important sources of infection and means of dissemination of the disease at the present time are the crowded Egyptian schools.

J. B. L.

Stilling (Strassburg). Pseudo-isochromatic Tests for the detection of Colour-blindness. *Third Edit., Georg. Thieme, Leipzig*, 1889.

The appearance of a third edition of Stilling's well-known tests is evidence that they are found of practical use in examinations for defective colour sense.

In the first few pages the author gives a short account of the common forms of colour blindness, and then directions for the use of the coloured plates in the examination for genuine colour blindness and for a lowered colour sense, *i.e.*, want of appreciation of colours which are much below the point of saturation.

There are 10 test plates, each consisting of squares filled by small irregular coloured spots, among which Arabic figures are traced out, generally in a confusion colour. Plates I. to VIII. are for the detection of red-green defect. Failure at plates I., II., III. indicates red-green blindness ;

at plates IV., V., a lowered colour sense for red and green. Plates VI. and VII. are said to enable the examiner to distinguish between cases in which there is and is not shortening of the red end of the spectrum. Plate VIII. is for the determination of blue-yellow blindness. Then follow two plates, IX. and X., which would seldom be called into requisition in this country at least, and are designed for the detection of simulated colour-blindness. The coloured plates have a dead surface, with the exception of plate VIII., which seems to have been produced in a different way from the others, and has a slightly glazed surface, from which objectionable light reflexes are thrown. When in use the plates should be placed in good daylight ; plate X. should be easily deciphered by a normal eye at 45 metres ; for the others, a shorter distance is requisite.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MAY 1ST, 1890.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

Corneal Tumour (*Fibroma ?*) *in a Man, aged* 72.—Dr. Benson (Dublin) read notes of this case. The tumour was attached to the upper portion of the cornea of a blind glaucomatous eye. It measured 5 millimètres in its longest diameter, 2 millimètres in thickness, and it was adherent to the surface of the cornea a little above the centre by 2 or 3 millimètres of its thin edge. The eye was said to have been blind for many years, but a few days before the patient came under observation he had knocked it against something, and since the blow had suffered intense pain. There was, however, no evidence of recent injury to the eye. The growth was dissected off the cornea, and on microscopic examination was found to consist of fibrous tissue with blood vessels and cells, the whole being covered with epithe-

lium, except at that part of the margin where it had been attached to the cornea. It had a dull, lustreless, grey colour, and was lenticular in shape. The writer referred to the great rarity of corneal tumours of any kind, and expressed his inability to account for the existence of the growth in his case. A model and microscopic sections and photographs were shown.

Optic Nerve Atrophy in Smokers.—Mr. Lawford read a paper based upon nine cases of optic nerve atrophy in which the symptoms in the early stage so closely resembled those of toxic amblyopia that the diagnosis made at first was that of tobacco blindness. All the patients were men and smokers, and most of them consumed a large quantity of tobacco. Treatment by abstinence from tobacco and the administration of nervine tonics led to no improvement; indeed, in the majority sight became progressively worse. The general features presented by these cases were gradual failure of vision, with central negative scotomata for form and colour. The ophthalmoscopic signs consisted of slight or well-marked pallor of the temporal half of the discs, without visible alteration in the retinal vessels. The chief distinction between these cases and those of ordinary tobacco amblyopia was found in the peripheral limitation of fields of vision, which was almost always discovered if sought for; whereas in tobacco cases the boundaries of the fields were in most, if not in all, instances normal. None of the patients under the writer's observation had symptoms of spinal disease, but one man, aged 51, became insane some months after his sight failed. He was of opinion that tobacco was certainly a factor in the causation of the optic nerve disease.

Mr. Adams Frost said he was familiar with cases similar to those just described. He looked upon them as cases of tobacco neuritis in which secondary atrophy supervened. He had long been of opinion that if vision deteriorated beyond a certain point in tobacco amblyopia recovery did not take place, and in such instances he was accustomed to give an unfavourable prognosis.

Mr. Edgar Browne (Liverpool) thought that the cases cited were undoubtedly instances of tobacco poisoning.

They occurred in persons of unstable nervous constitution, though the instability might not be displayed otherwise than in the behaviour of the optic nerves ; the instance quoted by Mr. Lawford of the three brothers, patients of his own, who were all affected in a similar way, bore out this impression. Many cases showing no contraction of fields recovered ; on the other hand, those in which the disease was severe and of long standing, and in which the fields were limited, did not recover. He had had recently under his own care two brothers, smokers, who both suffered from amblyopia ; in one the disease progressed and the field of vision became contracted ; in the other improvement occurred. He was not aware of any instances of similar optic nerve disease in non-smokers.

Dr. Hill Griffith (Manchester) did not believe that tobacco poisoning led to optic atrophy ; this was the general opinion expressed at the special meeting at which this subject was discussed some years previously. The apparent exceptions were, he thought, due to a mistaken diagnosis at the first visit, as had happened in his own experience, when from want of time the use of the perimeter was dispensed with in the determination of the field of vision and of the scotoma. Tobacco amblyopia might be complicated with or followed by atrophy of the nerves as an independent disease. He had published such a case in an ataxic patient in whom atrophy came on when the tobacco blindness had almost entirely disappeared.

Mr. Doyne (Oxford) said that he had found that cases of tobacco amblyopia which were likely to improve always experienced great temporary improvement in sight from the inhalation of nitrite of amyl. He thought the use of strong tobacco interfered decidedly with nutrition and assimilation of food by its action upon the digestive tract. As a result of this mal-assimilation the resisting power of the optic nerves or other tissues was diminished. He had frequently noticed decided improvement in appetite after discontinuance of tobacco.

Dr. Bronner (Bradford) spoke of the similarity in the effect of alcohol and tobacco on the optic nerves, and of the gaps which still existed in our knowledge concerning toxic

amblyopia. He was accustomed to stop the use of tobacco in all cases of optic nerve atrophy.

The Artificial Maturation of Immature Senile Cataract by Trituration.—Mr. M. McHardy read this paper, in which he said that after five years' experience of artificial ripening of immature senile cataracts, practised with increasing frequency and confidence, he was convinced of the truth of the following proposition: That complete ripening of immature senile cataracts may be safely and almost certainly secured in from eight days to eight weeks by preliminary iridectomy, with trituration of the lens through the cornea and pupil, done with judgment, experience, and care; that the ultimate results (surgical and visual) of extraction operations in such cases are quite equal to the results of similar operations for senile cataracts, which have been allowed to fully mature spontaneously; and, further, that the removal of such artificially-matured cataracts is entirely free from those risks, drawbacks, and often impaired ultimate results which follow from the removal of immature senile cataracts. He thought that a large debt was due to Förster for the initiation of this procedure. By memoranda from his first twenty-five and last one hundred cases the author furnished details regarding his past experience with, and present practice of, the procedure, and emphasised thereby how its safety and success grew with the operator's experience.

The following living and card specimens were exhibited:—

Mr. Tatham Thompson: (1) Cystic Detachment of the Retina; (2) Rupture of Choroid; (3) Depressed Fracture of Orbital Roof.

Mr. Brailey: Gouty Cyclitis.

Mr. Hartridge: (1) Cyst in Anterior Chamber; (2) Changes in the Iris in Glaucoma.

Dr. W. J. Collins: Monocular Kerato-iritis.

Mr. Lang: Pemphigus of the Conjunctiva.

Mr. Treacher Collins: Sections of Cornea from a Case of Xerophthalmia.

Mr. Hartley: Granuloma of Iris.

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Arch. d'Ophtal., March—April, 1890.

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Giornale di Neuropatologia, VII. 2.

Dubois and Renaut. Sur la continuité de l'epithelium pigmenté de la retine avec les segments externes des cones et des batonnets, et la valeur morphologique de cette disposition chez les vertébrés.
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Günsburg. Ueber einen Fall von typischer Retinitis pigmentosa unilateralis.
Arch. f. Augenheilk., XXI. 2.

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Lancet, May 3rd, 1890.

MacNamara. Rheumatic Neuritis and Neuro-Retinitis.
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Arch. f. Augenheilk., XXI. 3.

SCHIRMER. Ueber indirecte Verletzung der vorderen Linsenkapsel und Sphincter iridis.
Klin. Mon. Bl., May, 1890.

SCHULTZE. Ein Fall von metatastischen Carcinom der Chorioidea.
Arch. f. Augenheilk., XXI. 3.

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Arch. f. Augenheilk., XXI. 3.

C. CORNEA. CONJUNCTIVA. SCLERA.

GRŒNOUW. Knötchenförmige Hornhauttrubungen (Noduli Corneæ).
Arch. f. Augenheilk., XXI. 3.

SCHÖBL. Bermerkungen über Conjunctivitis hyperplastica und Catarrhus vernalis.
Centralbl. f. prakt. Augenheilk., April, 1890.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

GRŒNOUW. Fünf Fälle von Accommodationslähmung bei Heischvergiftung (Schinken).
Kl. Mon. Bl., May, 1890.

GULLSTRAND. Bidrog till Astigmatismens Teori.
Nord. Med. Arkiv., XXII. 2, 1890.

THEOBALD. Notes of two cases of squint and one of esophoria due to anisometropia in which the muscular anomalies were cured by glasses. Also a case of esophoria of unusual degree.
Amer. Journ. of Ophthal., VII. 2.

E. EYELIDS. LACRIMAL APPARATUS ORBIT.

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Arch. f. Augenheilk., XXI. 3.

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Arch. f. Augenheilk., XXI. 3.

SINUS OF LEFT ORBIT ASSOCIATED WITH DISEASE OF RIGHT UPPER CENTRAL INCISOR.

By Simeon Snell,

Ophthalmic Surgeon to the Sheffield General Infirmary; Consulting Ophthalmic Surgeon to the Rotherham Hospital.

Miss Kate G., aged 17, was brought to me by her father on March 8th, 1886. Over the malar bone just at the margin of the orbit, on the left side, was a sinus, which discharged pus. A probe passed in ran along the orbital wall, close to the margin, and gave the impression of bare bone. The patient was naturally a very good-looking girl, and the puckering occasioned by the sinus caused some amount of ectropia, and this was particularly noticeable when she laughed and even smiled, and was very disfiguring. The side of the face towards the nose was somewhat swollen, and had a feeling of being thickened.

The father attributed this condition to some trouble with her teeth, and gave the following account :—

About five years ago whilst running in the street, our patient had fallen against the kerbstone, hitting her mouth and fracturing the right upper central incisor tooth at its cutting edge. There is no evidence of the other teeth having been injured. The upper lip, which was considerably swollen after the fall, soon regained its usual size and appearance. A slight uneasiness was felt in the tooth, and continued for a few days. She was troubled only very occasionally with the tooth after this, until the middle of January, 1886, when the incisor began to ache, and it gathered at the root. There seems to have been a good deal of swelling of the gum, and

pus was discharged for some time. When this dental mischief appeared to be getting better, a little swelling was noticed in the lower eyelid over the malar bone. This was poulticed and burst, and a sinus discharging pus resulted.

At the time of her first visit to me the tooth was not very painful, but it did hurt. Pressure also over the gum and tooth caused a little pus to exude from the sinus at the margin of the orbit.

There seemed no question that the diseased incisor tooth on the *right* side was the starting point, from which had resulted the sinus under the *left* lower eyelid. On the other hand, there appeared evidence that the condition of the tooth had become rather better, and that less pus was discharged from the sinus. Under these circumstances, and considering the youth of the patient, it appeared the wiser course to temporise and endeavour to preserve, if possible, the incisor. I therefore dissuaded the father from immediately fulfilling his wish, to have the tooth extracted, The sinus was syringed out with a solution of boracic acid. A few days later, a small abscess formed on the gum just above the tooth which was opened.

After this the father was again desirous to have the tooth extracted, and therefore, at my request, he consulted Mr. J. Lee Pike, L.D.S. Eng., who removed the central incisor on March 23rd.

Mr. Pike very kindly sent me a report on the case, from which I make the following extracts :—" The right upper central incisor, when pulled or pressed with the fingers, felt as though it had an elastic attachment ; it was in colour quite opaque, such as one is accustomed to see in teeth containing dead pulps. It was thought that any endeavours to bring the parts back to a healthy condition by conservative treatment would only result in failure ; the evidence was strong that not only was the pulp of the tooth totally disorganised, but that the periosteum was completely stripped from the root ; therefore the removal of this particular tooth was strongly recommended. This was accomplished under nitrous oxide. It was noticed during the second stage of extraction—viz., torsion—that there was a feeling as though he tooth grated on dead bone. On recovery of the patient

from the anæsthetic, the gum was pressed, resulting in a rush of dark coloured blood, followed by thick pus. The alveolar socket was well syringed, and a small pledget of wool soaked in dilute carbolic acid loosely inserted. After extraction, the tooth was split open for examination; the pulp cavity was found full of pus with which the dentine appeared to be thoroughly saturated; the apical foramen was abnormally large, but whether from absorption or from the accident having occurred previous to completion of growth of the tooth is uncertain. March 26th. On seeing the patient to-day, it was found that the sinus into the mouth had quite closed, and that below the eye nearly so."

When she called on me a few days after Mr. Pike's last note, I found the sinus below the left eye completely closed. She saw me occasionally afterwards, and as late as Feb. 16, 1887; and on this date I find the note in my case-book is, "Looks well—hardly any eversion, even when smiling it is very difficult to detect." The thickening of the face towards the nose had also disappeared. To this I can now add that quite recently the father has been a patient of mine (May, 1890), and from him I learn that the benefit has been permanent.

This case appears to me to be of interest, and worthy of record. We meet with affections of the orbit in connection with diseased teeth, by no means very infrequently. In this review (*O. R.*, vol. i., p. 402), I recorded a case in which periostititis extended to the orbit, and optic-nerve atrophy resulted. Quite recently I saw a case of orbital cellulitis, having, unfortunately, a fatal termination; and here, also, the condition of the teeth was the starting point of the disease. This case I propose to relate before the Ophthalmological Society.

In the case now reported there is a feature of additional interest, because, whilst the faulty tooth was on the right side, the line by which the inflammatory process had travelled had crossed sides, and the sinus appeared under the left lower eyelid. The period which elapsed, five years, after the injury to the tooth should be noted.

It is evident that any attempt to preserve the tooth, which both Mr. Pike and myself were naturally anxious to do, would not have been attended with a good result.

IRIDESCENT VISION IN GLAUCOMA.

By Treacher Collins.

Curator of the Moorfields Hospital Museum.

The phenomenon of iridescent vision in glaucoma has been attributed to different causes. There are those who have sought a physiological explanation of it in the retina, and those who have looked upon it as being due to some physical cause situated in the refractive media.

Priestley Smith* suggests that it is probably due "to the latent physiological aberration being in some way rendered manifest or exaggerated." This he thinks is the result of increased pressure, in support of which theory he has described an experiment in which, after pressure on the globe, he saw rings of colours around lamps against a dark background; the order in which the colours were arranged being altered with the refraction of the eye.

Mauthner † thinks that the rings of colour may be the result of nerve irritation, and quotes a case in support of this view.

Dobrowolsky ‡ has been led to the same belief, as the result of some experiments he made on his own eyes in a Russian bath. On causing congestion of his head and eyeballs by washing them with hot water, he began to see rainbow-coloured rings round the gaslight, which gradually faded away on the subsidence of the hyperæmia of the head; he was able to recall these rings by pressure on the globes.

* Glaucoma, p. 75.
† Die Lehre von Glaucom, p. 48.
‡ Archives of Ophthalmology, vol. xv. p. 267.

Amongst those who have supported the physical origin of these rings the foremost is Donders.* He pointed out that the halo of colours remains stationary whether the light be fixed by the eye or not. Also, that on covering up the lower half of the pupil the halo disappears in the superior external and in the inferior internal quadrants, and *vice versa* when the upper half is covered. He thinks that the dilatation of the pupil and changes in the lens, which increase its refraction, may assist in the production of the halo.

De Wecker attributes it to "very slight alterations in the corneal epithelium caused by the temporary exaggeration of pressure."

In the early part of 1888, at the instigation of and in conjunction with Mr. Tweedy,† I made some trials with a solution of the hydrochlorate of erythrophlœine to test its asserted local anæsthetic properties. The instillation of a drop of a 0·125 per cent. solution into the eye was followed by considerable smarting and irritation, lasting about 10 to 30 minutes. Slight anæsthesia of the cornea was produced, but hardly any of the conjunctiva, never sufficient to obliterate the smarting caused by a 1 in 40 solution of carbolic acid. After about two hours the sight of the eye in which it had been put became very much blurred, everything appearing as if in a fog; and all lights having a pronounced circle of coloured rings around them, the red rays being the outermost.

The position of the red rays was not altered by changes in the refraction of the eye. The nearer the light was to the eye, the smaller were the halos, and *vice versa*. The halos remained stationary, whether the light was fixed by the eye or not. The blurring of vision was not due to any alteration in the accommodation of the eye. The cornea, on careful examination, was found

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* Archiv für Ophth., vol. viii. pt. 2, p. 165.
† *Lancet*, Jan. and Feb., 1888.

to be slightly steamy. There was no increase in the tension of the globe. The first specimen of erythrophlœine that was used produced slight dilatation of the pupil. A second specimen produced slight contraction. After the use of both these solutions the coloured halos were seen.

Thus by the use of these drops several of the symptoms that are present in glaucoma are produced, viz., the fogginess of vision, the coloured halos, together with the steaminess and anæsthesia of the cornea. The halos, as will be seen by the above description, were precisely like those observed by glaucomatous patients; the red circle being always the outermost. The following case shows that this is so even when the glaucoma has occurred in a myope:—

Edward R., æt. 59, was admitted to Moorfields Eye Hospital on March 20th, 1888. In the previous December he noticed a dimness of sight of his right eye, which at first came on only towards evening and had passed away by the next morning. It, however, steadily increased. He had occasional attacks of pain in the eyes. He saw rings of rainbow-colours around the lights at night—"the blue being the innermost and the red the outermost of these rings." He had had a cataract (probably traumatic) removed from his left eye when 16 years old.

On examination of his right eye there was seen to be distinct haze of the cornea; a good A.C.; a semi-dilated pupil, with two or three posterior synechiæ, T + 2.

He was myopic. $V. = \frac{6}{60} - 1D = \frac{6}{18}$. Field was contracted.

The halos produced by erythrophlœine cannot be connected with any dilatation of the pupil, for they were seen equally well after the use of the specimen which produced slight contraction of the pupil.

Lauder Brunton* and MM. Homolle and Quevenne, experimenting with digitalin, found that after its use halos were seen and, it is stated, a slight opacity of the lens produced.

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* *Lancet*, March 3, 1888.

To see if the iridescent vision caused by erythrophlœine was in any way connected with the lens, I dropped some of the solution into the eyes of two patients who had been operated on for cataract. The first, William B., æt. 15, had had a lamellar cataract removed from his left eye; and the second, Mary M., æt. 65, had had a senile cataract extracted from her left eye. Both these patients saw the coloured rings quite distinctly in the order before mentioned. In that form of glaucoma which comes on after extraction of cataract, patients occasionally complain of seeing halos of colour; this was so in a case of which I have recorded the details in the *Ophth. Hosp. Reports*, vol. xii., p. 39, and I have notes of other patients by whom they were observed under similar circumstances.

I think the above facts irresistibly point to the conclusion that the halos produced by erythrophlœine and by increased tension are due to the same cause, and that that cause must be looked for in the cornea.

In glaucoma it is in the earliest stages, often during periods of slight exacerbation of tension, that the coloured rings are most frequently seen, and when the steaminess of the cornea is only slightly marked. In the later stages, when this is more pronounced, the halos disappear. The same with the anæsthesia: in the early stages this is but slight; in the later stages, when the steaminess is greater and the halos absent, it is more evident.

The steaminess of the cornea in glaucoma is evidently at first an epithelial change, for if a little of the epithelium which readily detaches be rubbed off, a perfectly clear cornea remains.

Cocaine, as is well known, if used for some time, or in too strong solution, or if the eye be exposed after its use by the non-closure of the lids, produces a haze of the corneal epithelium, and, even occasionally, what appears like a vesicular eruption. I have used cocaine until this superficial haze was produced, in order to

observe if any halos around the lights could be seen when the eye was in this condition, but failed to see any. The changes in the epithelium were, I imagine, too gross. With erythrophlœine, the changes in the cornea come on slowly, and are only observed by very careful oblique illumination ; the anæsthesia is very slight, and the halos distinct. With cocaine, the changes in the cornea supervene more rapidly, the opacity is early seen, the anæsthesia is intense, and the halos absent.

The condition produced by the former may be compared to that of the earliest stage in a case of glaucoma ; the condition produced by the latter to that of a more advanced case.

Wurdinger,* by using drops of fluorescine or a methyl-blue solution on the cocainised eye of a rabbit which had been exposed so as to cause haziness of the cornea, and afterwards noticing the depth to which the coloration produced had extended, as compared with an uncocainised eye treated in a similar way, concluded that the action of the cocaine was such as to cause a greatly diminished lymph supply through the cornea and a consequent drying of the surface epithelium. He describes the miscroscopical examination of the corneæ thus experimented on, as follows : "During the early stages the epithelium remains entire ; its anterior layers then become thinned and flattened ; a little later the deeper layers begin to shrink, and ultimately the external cells are cast off at the spots where the epithelium is most damaged. The shrinking of the true corneal substance is so considerable as to produce depressions in its hinder surface." (*Ophth. Rev.*, V., p. 129.)

Thomalla† found that the introduction of an alkaline solution of fluorescine in acute glaucoma always coloured some portion of the cornea, and this was noticed in one instance, while the symptoms were still only premonitory.

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* Klin. Monatsbl. f. Augenheilk., Ap., 1886, p. 14.
† Centralbl. f. prakt. Augenheilk., Nov., 1889 ; *O. R.*, Feb., 1890.

In some cases of chronic glaucoma some coloration was produced ; but in the majority there was none.

Thus the resemblance of the condition of the cornea under the influence of cocaine and in glaucoma is borne out in this instance also.

It can be easily imagined that the stretching of the cornea consequent on the increased tension of an eye would tend primarily to diminish the lymph streams circulating through it, and, as a result of this, slight drying of the surface epithelium and possibly some shrinking of the cells and formation of spaces between them. Changes brought about in this way would tend rapidly to come and go with slight alterations in tension as are seen in cases of glaucoma. It is these early changes which give rise to iridescent vision. If the tension be long continued, secondary alterations would no doubt occur, and the condition of œdema of the anterior layers of the cornea described by Fuchs bed produced. The experiments of Knies and Weiss with chemical reagents tend to prove that there may be some extrusion of aqueous fluid into the tissue of the cornea when the intra-ocular pressure is raised. If the corneal œdema is produced in this way, it is difficult to explain why the anterior layers should be so much affected, and the posterior not at all.

PERLIA (Frankfort-on-Maine). The Anatomy of the Oculo-motor Centre in Man. *V. Graefe's Archiv.*, 1889, *Pt. IV.*, *pp.* 287-308.

Perlia gives, in the first place, a short account of our present knowledge of the oculo-motor centre. It lies under the aqueduct for a length of ten mm., immediately in front of the centres of the fourth nerve, and consists of several groups of large ganglion cells, with nucleus and nucleolus. These groups, in man, run so much together that it is very difficult to distinguish them ; but by means of serial sections of the centre in large mammals, and also in the fœtus and

infant, the groups can be differentiated. The whole centre forms an elongated triangle, with the apex below, bounded on each side by the posterior longitudinal bundle of nerve fibres, and divided into a larger ventral and a smaller dorsal group of cells. In 1881 Gudden demonstrated, by his degeneration method, what had previously been surmised, that the oculo-motor fibres partially decussate. Each nerve he showed to be in relation : the majority of its fibres with the ventral nucleus of the same side, the smaller part of its fibres with the dorsal nucleus of the opposite side. Perlia confirms this observation as to all the animals he has examined, but with this qualification—that some fibres pass down in the raphe and so out across the path of the posterior longitudinal bundle.

Perlia figures and describes a series of sections of the centre from behind forwards, and sums up his results in a diagram showing the various groups of cells forming the centre. The figures show the intimate relationship of the posterior longitudinal bundle with the oculo-motor centre, fibres passing inward from the bundle in considerable numbers, and the bundle itself becoming smaller in size as we pass forward in the series of sections. Another fact shown by the figures is that the decussation of the oculo-motor fibres is much greater at the posterior part of the centre, gradually diminishing, and ultimately disappearing as the anterior part of the centre is reached.

Perlia's diagram agrees in most points with that of Edinger, published in his twelve lectures on the structure of the nervous system. It shows the dorsal and ventral divisions of the centre already mentioned, but these groups are not simple. The ventral group of cells consists of four groups, two anterior and two posterior, situated symmetrically. The dorsal group likewise consists of four, two anterior and two posterior, making therefore eight groups in all. And situated centrally between these eight groups is what Perlia terms the central nucleus—an oval nucleus with long axis verticle, consisting, like the dorsal and ventral groups, of large ganglion cells, surrounded by fibres connected with the central grey matter of the ventricles.

Immediately anterior and internal to these groups is a

pair of symmetrical groups of small cells, described by Edinger and Westphal. The latter found this group of cells perfect in a case of ophthalmoplegia externa (*Ophth. Rev.*, vol. VI. p. 290), while all the other cells were degenerated, and he accordingly concluded that these groups form the centre for the smooth muscular fibres of the eye, the sphincter of the pupil, and the ciliary muscle.

These groups form the main body of the oculo-motor centre; but anterior to these lie four groups, consisting of smaller cells, two median and two lateral. The two median groups lie closely anterior to Westphal's nuclei, just described, while the two lateral are widely separated. These lateral anterior nuclei have been investigated and described by Darkschewitsch, and he claims for them the function ascribed by Westphal to the more posterior and internal group. The tract concerned in the pupillary reflexes lies, according to Darkschewitsch, in the posterior commissure passing from the lateral anterior nucleus close by the pineal body to the external geniculate body.

As to the function of these various groups of cells in the oculo-motor nucleus, Perlia admits that we are in almost complete ignorance. The stimulative experiments of Hensen and Voelckers point to the conclusion that the centres concerned in accommodation and in pupillary and convergence movements lie anterior, those for other ocular movements posteriorly. Staar's diagram, and the case of Kahler and Pick, in which there was paralysis of the levator palpebræ, rectus superior, and obliquus inferior, make it probable that the nuclei next the middle line from before backward govern (1) the ciliary muscle, (2) the rectus internus, and (3) the rectus inferior; while those placed laterally from before backward govern (1) the sphincter iridis, (2) the levator palpebræ, (3) the rectus superior, and (4) the obliquus inferior.

In a further experiment, Perlia enucleated the eye of an almost full-grown rabbit, and four weeks later examined the brain. The results led him still more decidedly to connect the posterior longitudinal bundle with the oculo-motor centre, and he found also that the bundle of fibres called the transverse peduncular tract, first described by Hall and

re-described by Gudden, was degenerated on the side opposite to the enucleated eye. This bundle passes from the optic tract in the anterior corpora quadrigemina, downward on the outer surface of the crus cerebri, to disappear in the base of the brain anterior to the exit of the third nerve. Perlia finds, however, that there is a very distinct branch of this tract degenerated in his case, which passes upward to the oculo-motor centre. He considers that further experiment is required as to Darkschewitsch's reflex fibres in the posterior commissure.

James Anderson.

Wagenmann (Göttingen). On suppuration of the Vitreous starting from Operation Scars and Cicatrised Prolapse of Iris. *Arch. f. Ophthal.*, *XXXV.*, 4.

This paper deals with a class of cases of great interest, both clinically and pathologically. Most ophthalmic surgeons have occasionally seen cases such as those described by Wagenmann, and quite recently in this country attention has been directed to them in a paper by Dr. Berry, read before the Ophthalmological Society (see *O. R.*, April, 1890). The subject is one of importance, and Wagenmann's contribution to its elucidation is of considerable value.

He describes 13 cases from Leber's clinique, in which suppurative hyalitis occured at periods, varying from a few months to some years, after healing of an operative wound or a prolapse of iris. Of different operations, extraction of cataract with cystoid cicatrix and iridectomy for glaucoma were those most frequently followed by this purulent inflammation. The author gives in detail the history of these cases, and results of microscopic examination of 11 of the 13 eyeballs. In all those examined, micrococci were found in the interior of the eye; the suppurative process appeared to have started from the cicatrix, at which point also micro-organisms were discovered.

In almost all cases the vitreous body was in actual contact with the cicatrix, and in this may be found the explana-

tion of a purulent hyalitis, and not merely a keratitis following an infection of the scar.

In discussing the causation of the panophthalmitis, Wagenmann propounds three hypotheses, in all of which it is taken for granted that the inflammation is of microbic origin:

(1) The micrococci may have entered the wound before it had healed, and have remained inert for a longer or shorter time.

(2) They may have invaded the cicatrix from the circulation having found in the tissues there the point of least resistance.

(3) The cicatrix may have become newly infected.

He regards the first two theories as improbable, and gives his adherence to the third, in support of which he adduces clinical and anatomical evidence. In some of his cases there was good reason to believe that the eye had suffered from a recent injury, and that infection of the scar had occurred at that time.

J. B. L.

STILLING (Strasburg). On the use of Aniline Colours as Antiseptics. *Revue Générale d'Ophtalmologie, IX. 4. April*, 1890.

Stilling explains the powerlessness of the antiseptics hitherto in use to arrest suppuration which has once began by the fact that they readily form precipitates, and are not diffusible. Some aniline colours, and particularly the violets, possess, according to Stilling, all the properties of a good antiseptic, as they not only readily kill micro-organisms, but quickly permeate the tissues in which suppuration has taken place. The result of bacteriological experiments, made in conjunction with Wortmann, was to show that aniline violets retard the development of bacteria, even in such feeble solutions as 1 to 64·000. More concentrated solutions (1 to 1·000 and 1 to 2·000) were found to kill at once the bacteria which might be present, and altogether prevent their further appearance.

After testing the therapeutic value of solutions of aniline

violet on animals, with the result that suppurative conditions of the cornea which had been experimentally induced were at once arrested, without any harm being done to the corneal tissue itself, a free use of the new antiseptic was made in numerous cases of different affections of the eye which presented themselves for treatment at the Strasburg clinic. The following are some of the results given :—In hypopyon-keratitis, and deep marginal ulceration of the cornea, the healing that took place under methyl violet and auramine was so rapid that Stilling predicts that this treatment will soon replace the actual cautery in these affections. Cases of interstitial keratitis, which usually take months to get well, were cured "in a short time." In serous iritis, even in bad cases, with great scleral injection and diffuse opacities of the vitreous, one or two weeks' treatment sufficed to remove all traces of irritation, and to cause a great clearing up of the vitreous, with corresponding improvement of vision. In some cases also of long-standing disseminated choroiditis, a great and permanent improvement was produced in a short time. Of this Stilling says : "The surprise was even greater to the patients than to me, although I had regarded this question with the greatest scepticism. I was obliged to suppose that the aniline passes by diffusion into the choroid, and there checks the development of the pathogenic bacteria."

The aniline treatment was also tried in a case of sympathetic ophthalmitis in a boy, which came on notwithstanding the enucleation of the injured eye, and which, after treatment with mercurial inunctions in the dark for a month, had resulted in complete occlusion of the pupil and the loss of all vision, with the exception of quantitative perception of light. Improvement immediately took place when a solution 1 to 1·000 of the aniline was dropped into the eye, and a continuance of this treatment led rapidly to a clearing up of the membrane across the pupil, and the disappearance of the inflammatory symptoms, with the result that after three months the child was able "to read large type." Stilling makes the following remarks in this case : "Those who have not seen the case might doubt ; as for me, I am convinced that without the treatment with aniline, which checked the development of the pathogenic

elements in the iris, the eye would certainly have been lost. The result was too striking, too rapid, and too lasting to admit of being a pure coincidence."

A therapeutic agent which is brought to one's notice with such a flourish of trumpets must, one would imagine, possess some of the advantages claimed for it. It is hardly likely that others will be able to confirm Prof. Stilling's report in all particulars, even although they should hold the same views as to the micro-organismal character of the various inflammations met with in the eye. From some personal experiences of methyl violet in the solution of 1 to 2·000, I can confirm its non-irritating nature and its diffusibility ; but I have not seen that it has any power in checking suppuration at all, and, indeed, its antiseptic properties seem to me but slight. I have used pyoctanin as recommended by Stilling. This preparation contains no arsenic, and is obtained from Merck, in Darmstadt.

George A. Berry.

E. Fuchs (Vienna). **Tenonitis after Influenza.** *Reprint from the Wiener Klin. Wochenschrift*, 1890, *No.* 11.

Fuchs reports four cases of tenonitis, *i.e.*, inflammation of Tenon's capsule with exudation into the space which separates it from the eyeball.

1. A labouring man, aged 46, had a sharp attack of influenza with severe pains in head, limbs, and body, which kept him in bed six days. On the fourth day of the attack swelling of the upper lid began and soon extended to the lower lid. During eight days the greatly swollen lids were completely closed ; then a free escape of matter occurred from between them and the swelling gradually subsided. Vision was not affected at the beginning of the attack, but when the lids reopened the eye was blind. When first seen, in the third week, there was still considerable swelling of the lids with proptosis, and the eye was pushed for-

wards and downwards, and much limited in its movements, especially outwards. The conjunctiva was injected, œdematous, and thickened; upwards and outwards from the cornea it presented a loss of substance laying bare the sclera; a similar gap was present below the cornea about over the anterior limit of Tenon's capsule. Purulent secretion escaped from both of these openings, and a fine probe could be passed through them backwards into Tenon's space. There was pus in the anterior chamber and in the vitreous; the pupil was small and adherent; tension was reduced and light perception lost. The patient suffered also from catarrhal pneumonia. Pneumococci were found in the pus which escaped from Tenon's space; mice inoculated with the pus died of septicæmia, and from them again cultivations of the cocci were obtained.

2. A man, aged 35, was admitted into hospital with symptoms of influenza, and with inflammatory œdema of the right eyelids which had begun two days previously. The conjunctiva of the globe was greatly swollen and protruded between the lids. The eye was pushed forwards and downwards; it was almost immovable and excessively tender to the touch; pressure on the margin of the orbit did not give pain. There was no increase of secretion. As the symptoms suggested a retrobulbar abscess, an incision was made through the upper lid deeply into the orbit; no pus escaped; the drainage tube was removed a few days later, and the wound healed quickly without suppuration. The œdema of the lids and conjunctiva, and the exophthalmus gradually subsided. Fourteen days after admission only a slight ptosis and a trace of exophthalmus remained.

3. A woman, aged 49, suffered from influenza. On the fifth day of her illness, improvement having begun, swelling of the right eyelids with acute pain set in. The same extreme œdema of lids and conjunctiva, with displacement and immobility of the globe, and the same absence of morbid secretion as in the foregoing case, were present. In view of the favourable termination of the previous case, no incision was made. The swelling rapidly disappeared, and at the end of about a week the condition of the eye was again quite normal.

4. A man, aged 42, presented himself at the hospital with symptoms closely resembling those which were present in cases 2 and 3, but of less intensity. He gave no history of influenza, but attributed the attack to a cold draught to which he had been subjected on a railway journey. The swelling of the lids and the exophthalmus subsided almost completely on the third day, and an ordinary catarrhal conjunctivitis in both eyes followed.

Analysing these cases, Fuchs points out that the diagnosis of purulent tenonitis in the first case was established by the entrance of the probe into Tenon's space and the escape of pus therefrom. That the suppuration in the globe was secondary was proved by the fact that, at a time when the inflammatory changes were already very pronounced, vision was still retained.

In the three other cases the situation and nature of the exudation could not be directly observed, for no perforation occurred ; but this very fact proved that it was not suppurative, but serous or plastic. Was it situated in Tenon's space or further back in the orbit ? The great œdema of the conjunctiva as compared with the moderate exophthalmus indicated proximity to the conjunctiva rather than a deeper situation. The extreme impairment of the movements of the globe and the absence of changes at the optic disc pointed in like manner to Tenon's space as the situation of the inflammatory exudation.

Secondary affections of Tenon's capsule are not uncommon. Thus in severe cyclitis and panophthalmitis there is often considerable exophthalmus. In such cases the inflammation extends from the globe to the surrounding parts. It is of a plastic kind, and leads to adhesions between the sclera and Tenon's capsule which render difficult the subsequent enucleation of the eye.

Primary tenonitis is rare. It may be purulent or non-purulent. The purulent form was sometimes met with after squint operations when unclean instruments were used. The non-purulent variety presents the symptoms described in the three cases here recorded. Its cause is obscure ; in many cases it is attributed to cold.

A connection with influenza was evident in two of the

four cases, not proved in the other two. In these, however, Fuchs suspected such a connection because influenza prevailed at the time, and because his three non-suppurative cases all came under treatment within the space of 14 days, whereas up to that time in his very large clinic he had only met with one well marked case.

P. S.

A. Fage (Bordeaux). Ocular Complications of Influenza. *Archives d'Ophtalmologie, March—April,* 1890, *p.* 136.

The writer records thirty-two cases in which the eye or its appendages were affected in connection with influenza. The observations were made in the clinic of Professor Badal during the months of January, February, and March, 1890. Simple congestion of the eye with lacrimation, such as is often seen during the attack, is not included in this group of cases.

The cases were of the following kinds :—Affections of the lids and tear passages, four cases, viz., blepharitis, eczema, hordeolum, and abscess of the sac ; conjunctivitis, five cases, viz., catarrhal and follicular ; kerato-conjunctivitis, ten cases, chiefly phlyctenular ; corneal ulcers, five cases, one of them combined with hypopyon ; acute iritis, two cases ; acute irido-choroiditis, two cases ; acute glaucoma, one case ; paralysis of the superior rectus, one case ; paralysis of the external rectus, one case ; amblyopia without ophthalmoscopic change, one case.

Summarising these observations, Fage maintains that ocular complications after influenza are commoner than has been generally supposed.

There is no apparent connection between the severity of the influenza and the ocular trouble, for this latter is as apt to occur in the mild as in the severe cases.

The eye disorder may make its appearance during the height of the disease, during its decline, and even when convalescence is far advanced. In the last epidemic the larger number of cases, and the most severe, occurred late in the course of the disease.

The eye trouble may occur at any time of life.

Its occurrence is favoured by bad constitutional conditions and by antecedent eye troubles. In many cases, however, the ocular complication appears to be a true infective process independent of any predisposing cause, as, for instance, the cases of acute inflammation of the lids, conjunctiva, and cornea, and of abscess of the lacrimal sac. This does not necessarily prove that the infective material is of a peculiar and specific kind. It is probable, rather, that the lowering of vitality in the tissues renders them liable to infection from organisms which are ordinarily inert though present.

The treatment of these ocular complications differs in no way from that usually required in parallel cases. In view of the increased liability of the eye to infective inflammation during and after an attack of influenza, the routine use of antiseptic lotions is suggested. P. S.

LANDOLT (Paris). Ocular Manifestations in Epidemic Influenza. *Semaine Medical*, 1890, *No.* 3.

The most frequent ocular complication observed by Landolt during the recent epidemic was a special form of conjunctivitis which came on usually during convalescence. Both the ocular and palpebral conjunctiva were affected, and the episcleral tissue in many cases participated in the inflammation, the affection being in truth more an episcleritis than a conjunctivitis.

In other cases the author met with acute œdema of the lids, which also occurred during the period of convalescence, and in yet other patients abscess of the eyelids, the latter generally appearing some weeks after the general affection had passed off. J. B. L.

CARL HESS (Prague). Congenial Deformities of the Eyeball. *V. Græfe Archiv. XXXVI.* 1., *p.* 135.

This paper is a sequel to Hess's former paper on microphthalmos (*vide O. R., Feb.*, 1889, *p.* 45).

CASE I. Congenital staphyloma posticum in a white rabbit. Ophthalmoscopically a circular greyish white excava-

tion could be seen to the temporal side of the papilla, crossed by a retinal vessel, and some white nerve fibres. Refraction in it was highly myopic. The rest of fundus hypermetropic The excavation did not reach to the disc itself.

Post-mortem the staphyloma was visible externally, the sclerotic being thin and bulging. Microscopically the sclerotic was found to be about $\frac{1}{10}$ its normal thickness in the staplylomatous region, but was histologically normal. Nothing representing choroidea could be found in the floor of the staphyloma, unless a few isolated vessels on the inner surface of the sclerotic may be regarded as choroidal. The retina and its epithelium were normal all over the fundus, but at the edge of the staphyloma the bacillary layer became smaller, and soon disappeared entirely. The inter-nuclear layer diminished, and the nuclear layers ran together. The external nuclear layer then disappeared at the same point as did the bacillary layer, so that near the edge of the staphyloma nothing was to be found in its floor but a delicate membrane consisting of a nuclear layer, the internal reticular layer, and the ganglionic layer. This membrane could be followed all over the staphyloma, but its elements soon lost their normal appearance almost entirely. No signs of inflammation could be detected.

Case II. A brown rabbit—the left eye smaller than the right, the cornea clear, coloboma iridis, with shreds of persistent pupillary membrane. Lens clear, except for a circle of dark brown pigment at its posterior pole, and slight haze of the adjoining fibres. A bright white reflex could be obtained from the fundus behind the coloboma of the iris, and the adjoining portion seemed to exhibit choroidea without any retina.

Post-mortem there was seen a large staphyloma posticum in the lower portion of the globe. The optic nerve passed from above downwards obliquely through the ectasia. On opening the globe this ectasia was found to be formed by a cyst-like cavity in the sclerotic, which communicated by a small circular opening with the interior of the globe.

The choroidea appeared to be normal, except for a circular coloboma, which was separated from the iris coloboma by apparently normal choroid.

The lens was dislocated backwards and downwards, and adherent to the sclerotic by a small pigmented band, which divided the choroidal coloboma into two nearly equal parts. The retina seemed normal, except in the region of the coloboma, where its pigmentary layer was deficient. In some sections it seemed as if the external layer of the secondary optic vesicle persisted in the coloboma as non-pigmented cells, but in most no such layer was present. The inner layer (the retina) persisted for a short distance only slightly altered, the nuclear layers not sharply separated, and the bacillary layer deficient; but towards the above-described pigmented band the retinal layers began to lose more and more their normal appearance. At the opening between the cyst and the globe, the retina could be traced round the edges of the sclerotic into the cyst, whose walls were entirely lined by it. Near the opening the separate retinal layers were distinctly visible; further on, the retina consisted merely of medium-sized spindle cells, with slight intercellular substance. In it were seen, in places, large round or polygonal cells, single or in groups. Some very large—0·10 to 0·18 mm. in diameter—and most contained a faintly stained nucleus. While some of these giant cells were possibly the result of the fusion of adjoining cells, Hess is confident that the existence of many of them could not be accounted for by that hypothesis, but that they must have proceeded each from one individual cell. They could not be derived from the external layer of the secondary optic vesicle, as the pigment epithelium did not extend to any distance from the edges of the actual coloboma, and as similar though smaller cells were present in the retina itself, in the interior of the globe. Which of the tissues of the inner wall of the secondary optic vesicle produced these cells, Hess is unable to decide.

The changes in the ciliary body and the anterior portion of the coloboma resembled those in Case III. It is plain that the closure of the secondary vesicle had been checked in this eye by the embryological adhesion of the lens to the sclerotic and choroid formed by the pigmented band described above.

Case III.—The eye of a rabbit, small, with flattened

but clear cornea, shallow anterior chamber, small coloboma of iris, opacity at posterior pole of lens, red reflex from the periphery of fundus, and white from the centre and downwards. Post-mortem, scleral staphyloma downwards and outwards from the papilla, pierced obliquely by the optic nerve. No vitreous to be seen. The lens displaced downwards and outwards. Retina macroscopically absent in region of coloboma. Choroidea, elsewhere normal, showed a large coloboma surrounding the papilla, and extending to the ciliary body, which existed as a bridge 2 mm. broad at the anterior end of the coloboma.

The sclerotic in the staphyloma was very irregular and cribriform. No pigment present here, nor in the whole coloboma. Neither vessels nor white nerve fibres visible. A white tendon-like band ran from the lower edge of the papilla across the coloboma to the posterior pole of the lens-when it spread over the capsule, sending a band then for wards and downwards to unite with the sclerotic at the anterior edge of the coloboma. A second band ran from near the side of the papilla to unite also with the lens.

The essential difference between this and the previous case lies in the wider opening that existed between the staphyloma and the interior of the globe, and the less extensive adhesion of the lens to the sclerotic. Giant cells were present in the interior of the cysts, and their walls were lined by retina, as in the former case.

Case IV.—A woman aged 40, the right eye blind from birth, but not at any time inflamed. The left blinded by atrophy of the optic nerve. The right eye smaller than the left, cornea flatter, but transparent, coloboma iridis downwards, lens opaque. Post-mortem, the globe elongated backwards by a staphyloma occupying principally the lower segment. The vitreous exhibited concentric lamination and a coloboma downwards.

The papilla divided vertically by a slightly prominent band, which ran across a circular coloboma of the choroid, and towards the equator, split into two divisions, and attached itself then to the sclerotic in the floor of the coloboma. There was no pigment in the coloboma. Ciliary body and iris normal, except that the latter was defective,

corresponding to the coloboma, its connective tissue ill-developed, and its muscular tissue absent. The iris epithelium normal, but pigment cells spreading into the spaces of Fontana, and the posterior surface of the cornea in the region of the iris coloboma. The ciliary body and muscle not so developed at the coloboma as elsewhere, but the epithelial pigment passing from iris to ciliary body in normal fashion. Lens subluxated upwards, and the zonula absent in region of coloboma.

Retina nowhere normal, bacillary layer absent, nuclear layers fused for the most part and merely connective tissue separating them from the pigment epithelium. No ganglionic layer.

Sclerotic and choroid normal, except that the choroid disappeared in the region of the coloboma, as did also the retinal epithelium, and the retina itself. The latter was represented in the floor of the coloboma by a minute layer of mere connective tissue. This layer seemed to lose itself upon the above described band running across the coloboma which may be explained by the supposition that, as in the last two cases, here also the secondary optic vesicle had failed to close in this position, and its inner layer had formed adhesions with the connective tissue of the fœtal vitreous. No signs of inflammation were present anywhere.

The first case presented a small scleral ectasia in the posterior pole, the second a large one communicating by a small opening with the globe, the third with a smaller ectasia with a larger opening, and the fourth an ectasia occupying nearly the whole posterior half of the globe. In the second and third cases the vitreous was represented by a sclerotic-like tissue adherent, on the one side, to the external tunics of the secondary optic vesicle, and on the other to the posterior surface of the lens. This evidently represents fœtal connective tissue which had failed to undergo the normal metamorphosis into vitreous; and these cases resemble the second of the human microphthalmics described in Hess's former paper.

The scleral cysts have been explained by Kundrat as produced by proliferation of the retina into the tissues

lying underneath the globe; and by Arlt, by stretching of the lower wall of the eyeball. Hess believes that Kundrat's theory will account for the human microphthalmic formerly described, but adopts Arlt's to explain the present series of cases. The occurrence of orbital cysts can be accounted for by the condition of affairs in Case II. A complete closure of the opening of communication in this would have produced an orbital cyst.

This series of cases is brought forward by Hess principally as a confirmation of his opinion that inflammation has very much less to do with the production of congenital malformations than has been generally assumed.

J. B. S.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JUNE 12TH, 1890.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

The Artificial Maturation of Immature Senile Cataract by Trituration.—Mr. McHardy concluded his paper on this subject, the first part of which he had read before the Society at the meeting on May 1st. An abstract of this paper was published in our June number, to which readers are referred. The author gave further details, and added that in his last hundred cases he had been obliged to remove the lens sooner than he intended in two cases, in both of which, however, useful vision had been restored. In three per cent. of the cases, sight had been entirely lost.

Artificial Ripening of Cataract: Förster's Operation.—Mr. Simeon Snell (Sheffield) read a paper on this subject. After a passing reference to other methods of dealing with the class of cataracts in which the process of maturation proceeded so slowly as to greatly interfere with the comfort of the patient, and to often occasion worry and distress, he proceeded to speak of Förster's operation. He had performed

this method of causing ripening by trituration of the lens capsule through the cornea in ten cases; being about six or seven per cent. of the cataract (senile) operations during the same period. He gave particulars of each case, and thought well of the operation. If performed with care, it appeared free from harm; if its immediate object was not attained, as in two of his cases, no evil results had ensued. No iritis nor ocular irritation had been occasioned in any case. The increased opacity showed itself frequently a few days after the operation, and extraction of cataract could generally be proceeded with in a month to six weeks subsequently. The stroking of the capsule should be gently done and in the centre as much as possible. The iridectomies in his cases had been small and made downwards, and the extractions were performed by a shallow lower flap.

Mr. Critchett said that at a meeting at Leeds a year ago, he had expressed the hope that at no distant date an opportunity might offer of gaining statistics on this important subject, which must be faced sooner or later. Already great progress had been made in the methods of extracting cataract. He spoke of seven or eight cases of which his experience consisted, which had been commenced under compulsion, and proceeded with only with great caution and some misgiving. Iritis had occurred in two, but no eye had been lost. During the last few years his success had quite equalled his expectations, and he thought that immature cataracts could be removed almost as well as mature ones. He was convinced that it was wiser to wait till the patient could no longer see to find his way about before operating, and referred to a saying of Mr. Critchett, senior: "You must always remember that the probabilities in ophthalmic surgery are so delightful that everyone would want to become an oculist; the possibilities, however, are so dreadful that they can only be mentioned to oneself in a whisper."

Mr. Tweedy said that his experience in dealing with immature senile cataract was scarcely comparable to Mr. McHardy's. For more than nine years he had operated when the necessity arose upon unripe cataracts—that is, where both eyes were so affected that the patient was

unable to follow his occupation. The results had been satisfactory, and this he ascribed entirely to the *modus operandi* he employed, which consisted essentially in opening the lens capsule at its extreme upper periphery after performing iridectomy. By this procedure the face of the anterior capsule was untouched, and any lens matter which remained behind or which formed subsequently was enclosed in the capsule in its natural position, and did not come into contact with the iris. In the seven years, 1881 to 1888, he had operated upon twenty-nine immature senile cataracts at Moorfields Hospital. Of these, one eye was lost from late serous iritis and glaucoma, two suffered from a sharp attack of iritis, and one lost a little vitreous. He assured Mr. McHardy that most of his *confrères* were fully alive to the importance of dealing with this class of cases, and referred to the want of agreement between surgeons as to what constituted an immature cataract. He had had no personal experience of trituration of the lens, but he thought that there were several possible drawbacks to the operation. Mr. McHardy had stated that iritis frequently followed trituration, and this was certainly an undesirable state of things to precede extraction ; there was another possible drawback, namely, that the friction might induce thickening of the anterior capsule, and thereby lead to difficulties in secondary capsule operations. Of the twenty-nine cases referred to, a "secondary" needling was required in thirteen ; he had not examined his records for the last two years.

Mr. Hulke said that he had come rather to listen and learn than to speak, as his experience did not furnish him with sufficient grounds for forming a final judgment ; but he fully endorsed the views of Mr. Critchett and Mr. Tweedy with regard to the ethics of this question, and would not himself feel justified in meditating the operation or suggesting it to a patient, as a practice to be generally adopted. He had hitherto reserved the extraction of immature cataracts for cases demanding exceptional treatment.

Mr. Mackinlay said he had not taken kindly to the trituration operation described by Mr. McHardy, when he had first seen it performed. Recently he had been more favour-

ably impressed therewith, and had performed the operation in about twelve cases. In all he had obtained satisfactory results, and no undue toughness of the capsule had followed.

Mr. Henry Eales (Birmingham) said he had not yet had a very wide experience in operating upon immature cataracts, except in some cases of nuclear opacity. He had operated in such cases now about thirty times, being at first compelled by circumstances. One case was that of a farmer, who had already lost one eye and was incapacitated by opacity in the other lens. The result was good, the man obtaining vision equivalent to $\frac{5}{6}$. In no case was there failure in obtaining maturation. The lenses were removed about six weeks later. In several cases there were slender adhesions of the iris to the capsule, which easily gave way to atropine. The lens generally came away very cleanly, leaving a clear pupil, and no after-needling was required.

Dr. Hill Griffith (Manchester) had done the operation in twenty-eight cases, but always by direct trituration by means of a silver spoon introduced through the iridectomy wound. In twenty-four of these cases, no result whatever was produced in thirteen, or just over a half, and in one of these partial dislocation of the lens took place; this was the only mishap he had had from the operation. In the remaining eleven cases rapid maturation was effected, followed by extraction, with slight loss of vitreous in one case only. Good vision was ultimately obtained in all, but convalescence was very tedious from retention of cortex. The operation was useless for dealing with opacities which had no natural tendency to progress, as he had proved in zonular cataract and cartwheel-like opacities in the posterior layers of the lens, and he had been disappointed in several cases of exceptionally slow growing cataracts, so that he thought that the cases in which the procedure might be of use were not so frequent as Mr. McHardy's statistics seemed to indicate.

Mr. Brailey thought the question required very careful examination, first on account of the limited applicability of the method, and secondly with regard to the ethics. In many cases, the condition of the lenses did not seriously

interfere with the patient's occupation, and progressed extremely slowly. Of eighty-two immature cataracts seen in one year and a half, twenty-six were seen a second time, and of these only four required operation, and only four others had progressed appreciably. In many, vision had actually improved, probably through a diminished use of the eyes. The ethics of the question deserved also careful consideration. Iridectomy had once been introduced as a panacea for eye diseases, and had brought operating to some extent into disrepute. Many cases operated on when immature would probably not have advanced if left alone. The eye was subjected to great risk by the operation, and he thought they should advance very cautiously in its employment.

Mr. McHardy, in response, thanked the members of the Society for the interesting discussion which had been elicited, and replied briefly to some of the remarks made by different speakers.

Living and Card Specimens.

Sir William Bowman: Portrait of the late Professor Donders, of Utrecht.

Dr. W. J. Collins: Cases of Persistent Capsulo-pupillary Membrane.

Mr. Gunn (for Dr. Werner, of Dublin): Abnormality of Retinal Veins.

Mr. Stanford Morton: (1) Tumour of Plica Semilunaris; (2) Upward Coloboma of Iris.

Mr. Lawford: Embolism of a Branch of the Central Retinal Artery.

Mr. Gunn: Case of Proptosis (unilateral) with Intracranial *Bruit*.

Mr. Brailey: Case of Microphthalmos, with other Congenital Defects.

A NOTE ON THE CONJUGATE MOVEMENTS OF SQUINTING EYES.

By Edgar A. Browne,

Surgeon to the Liverpool Eye and Ear Infirmary.

A phenomenon connected with the conjugate movements of squinting eyes is, so far as I recollect, not mentioned in the text-books.

When examining a squint it is customary to cover one eye with a screen, and cause the patient to fix with the other. When this is done the angle of deviation is the same in each eye, and we assume that the degree of convergence is constant. But if with both eyes open (the fixer being directed straight forward) conjugate movement is performed, the angle will be seen to undergo modification.

Suppose the left eye is squinting inwards. Let the patient now fix an object such as a pencil held in the mesial line. Let this be moved to the temporal side till the extreme lateral excursion of the fixing eye is attained. The left eye will, of course, be now turned towards the nasal canthus. If now the object of fixation be slowly moved from the right to the left side of the patient, it will be found that the fixing eye (right) travels as far as the mesial line before the left begins to move in concert with it. That is to say, the fixing eye moves, but the squinting eye remains stationary. When the right eye has reached the mesial line, then both eyes move in due association towards the left.

The same thing occurs if the squinting eye is used as the fixer, but there is more difficulty in performing the experiment, for when the eye is amblyopic there is

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always a strong tendency for the better eye to take up the fixation. Still the phenomenon is virtually the same. It amounts to this, that the movements of squinting eyes are performed in due conjugation, the angle of the squint remaining constant, until the extreme inward deviation of one eye has been reached. Then the external rectus of the eye which is turned outwards is able to resume an independent action, and to continue the movement outwards. By this means it is able to reduce the angle of the squint, and, to a certain extent, to restore the parallelism of the visual axes.

We learn from this observation that, under ordinary circumstances, the centre for conjugate movements acts in the same manner in squinting eyes as in those with parallel axes, but that when once the limit of internal movement has been reached by one eye, the external rectus of the fellow eye is able to exert an independent and supplementary action. This action continues only so long as the habitual angle of the visual axes is exceeded. When it is re-established, conjugate movement is re-established also. Beyond this, it indicates that the internal rectus is capable of being elongated by the power of the external, and that there is no actual shortening of the muscle as supposed by some, at least, in squints of a moderate length of duration. Perhaps in very old standing squints it will be found that the internal rectus has undergone such permanent shortening that the external has not power to influence the angle during forced conjugate movements. However this may be, it is interesting to note that the centre for conjugate action works exactly in the same manner in squinting and in non-squinting eyes, when they start from the position of rest. In normal eyes the axes are parallel ; in squinting eyes they are crossed at a definite angle ; this angle is probably determined more by a definite want of balance in innervation than by a structural shortening of the apparently offending muscle.

H. D. Noyes (New York). A Text Book on Diseases of the Eye. *New York: William Wood & Co.*, 1890.

This handsome book contains more than 700 pages, and is illustrated by 6 chromo-lithographic plates, 5 plates in black, and 236 wood engravings. The following extracts from the preface will indicate something of its origin and scope:—"This volume is an outgrowth from a treatise on diseases of the eye, published in December, 1881, in Wood's library of standard medical authors. A similar arrangement of subjects has been adhered to, viz., considering in the first part the general anatomy and physiology of the eye, with its functional disorders, and taking up, in the second part, inflammations and organic textural changes. . . . The spirit of the book is clinical, but an adequate preparation for clinical and practical work includes a wide range of preliminary knowledge. . . . In accordance with the practical intent of the book, mathematical formulæ have been omitted; pathology and microscopic anatomy have been presented so far as seemed helpful to an intelligent account of morbid processes; the share which micro-organisms have in exciting diseases of the eye has been fully recognised. No little labour has been spent in setting forth the relations of the eye to the brain and nervous system, as both illustrations and descriptions testify. The participation of the eye in numerous general diseases or lesions, of remote organs, such as the kidneys, the uterus, the heart, etc., and the reflex influence which the eye can sometimes exert upon distant parts have been set forth. The writer has quoted his own cases and experiences, and stated his own opinions; he has familiarised himself with the work of others, not only in their writings, but pretty largely by personal acquaintance, and drawn freely upon their labours, as may be seen by the references in the text, and by the bibliography."

A work so important by a writer so well known will certainly attract much interest on both sides of the Atlantic, and very many of his professional brethren will

be glad to see in black and white the outcome of Professor Noyes's long experience. To adequately review such a book is impossible; we can only make a few criticisms and note the author's opinion and practice in connection with a few points of special interest.

The least satisfactory feature is, in our opinion, the literary style. To speak plainly, the writing is in many places careless; and, as a consequence, the descriptions and explanations are less precise and clear than one would expect to find them in a leading work on the most exact branch of medical science. For example, the chapter on the ophthalmoscope begins as follows:—"The invention of the ophthalmoscope by Helmholtz, in 1851, was the result of a careful study of the conditions which ordinarily prevent the pupil from emitting light from the eye, or why it looks black. He demonstrated that this accorded with well-known laws of optics, of which one is that light passing through a lens follows the same lines, both when entering and when returning, in case any can return." The initiated reader will understand the meaning of this, though he may smile at the mode of expression; but what will the learner gather from it? He will gather, in the first place, that the pupil ordinarily emits no light, which is not the fact. What Helmholtz did was to explain why the pupil ordinarily *appears* to emit, or more correctly to transmit, no light from the eye. A little further on we read the following account of direct ophthalmoscopic examination:—"Next the eye should be inspected by the upright image, the observer coming so close to the face as even to touch it, and bringing the light to the requisite position to permit close approach. Now it will be needful to put behind the mirror such glasses as neutralise refractive errors, and the details of the fundus will be more fully appreciated, besides learning what is the state of refraction." And again, "An astigmatic observer should have his correction placed upon his ophthalmoscope." Will not the student, ignorant of ophthalmic jargon, be puzzled to know how an image can inspect the eye, and how the details of the fundus can learn the state of refraction, and what it is which he is to place upon his ophthalmoscope? Speaking of a favourite trial frame, our author says—"It has served

me for more than twenty years with great satisfaction." Should not this testimony come from the servant rather than from the master? Such blemishes are, of course, of secondary importance, but they are very objectionable, and are much too common in our current medical literature. Leading medical authorities did not write thus fifty years ago; why should they do so now?

Looking now to the matter rather than to the manner, we note the following points:—For the diagnosis of refractive errors, a preliminary effort with the test-types and spectacle box is recommended; then, recourse to the refraction ophthalmoscope. The shadow test is fully and well described, but not as though the writer used it in his daily work. With regard to the treatment of hypermetropia, its partial or complete correction, and the need for atropine in estimating its amount, excellent advice is given. Speaking of young persons with slight degrees, the author says, "so long as their accommodation can without conscious strain overcome their error they need no aid." Of rather older persons similarly affected, "the convex glass, which makes reading comfortable, is all they need. This they may use at discretion, and there is no occasion for a distant glass, and atropine need not be used in the examination." But when, in cases of higher degree, "the difference between the glasses objectively found and subjectively approved is too great, and the patient's answers show that his accommodation is under severe strain, or his subjective symptoms are severe, then a mydriatic must be used." Very different, and, as we think, very mistaken practice in this matter is advocated by some of Professor Noyes's countrymen. (See the report of the American Medical Association in our present number.)

Concerning the nature of myopia, Noyes holds by the views of Donders, rather than by those of later writers who attach less importance to over-use of the eyes and less value to precautionary measures. "The pre-disposition may be hereditary, but the determining causes are acquired and largely preventable.". . . "With the clear evidence that the error is brought about by improper modes of life and of use of the eyes, preventive measures become imperative."

Concerning the use of atropine as a means of checking myopia, "this remedy has now few supporters, and the most that can be claimed for it is that under its use the degree abates about 1 D.". . . "Abandonment of near work is the essence of the benefit, not suspension of accommodation."

To those who are in the habit of using the shadow test by routine in nine-tenths of their cases, it is curious to read, in the chapter on astigmatism, a laborious account of the estimation by means of the clock face and similar appliances; to be told that the direct method of ophthalmoscopy is next in value; and that the ophthalmometer of Javal and Schiotz is constantly made use of in the author's private practice.

In the chapter which deals with the movements of the eyes we find a series of diagrams, from Obersteiner, which enable the reader to follow the most recent discoveries concerning the origin and course of the motor nerves in the brain. Of electricity, as a remedy in cases of paralysis of the ocular muscles, the author says, "Its efficacy is, to say the least, very doubtful." He is convinced that the amblyopia of squinting eyes is not a result of non-use, but an antecedent, commonly a congenital, condition which "is entitled to a place alongside of hypermetropia in the production of converging squint." In performing tenotomy for strabismus, he cuts down upon the tendon, picks it up with forceps, snips a hole through it with scissors, passes a blunt hook upwards through the hole, and divides the upper half of the tendon, a second hook downwards in the same manner, and divides the lower half; in his hands, "this method secures the complete division of the tendon with the least disturbance of the structures, and through the smallest wounds. The conjunctival wound is always united by a stitch of very fine black silk." In divergent strabismus of moderate degree without paralysis, a suggestion of Dr. Gruening has proved of great value. One or both of the externi having been divided, "the two eyes are coupled together by a suture, which is attached to the inner side of each globe and carried across the nose. It takes its hold on the conjunctiva vertically, near the cornea, and, when tied,

both eyes are held immovable and in convergence. It is left in place for twelve or twenty-four hours. Care must be used to get no more effect than is required. An excess of ten or fifteen degrees convergence at the beginning is desirable, for this amount soon disappears."

Concerning the dependence of serious nerve-disorder on asthenopia, of which so much has lately been written in America, our author writes as follows: "It has been asserted that chorea is caused by this condition, but my observation has been that usually the order is otherwise, and that it is chorea which gives rise to debility and irregular action of ocular muscles as one of its manifestations. Epilepsy has been asserted to depend on this cause. I cannot deny that, in a few cases, eye-strain may have been demonstrated to be an exciting cause or occasion, but there has been behind it a deeper lesion of the general nervous system."

In the treatment of conjunctivitis, Noyes, like almost all other authorities, prefers nitrate of silver to all other remedies. He quotes the following table from Weeks, who, experimenting upon the staphylococcus pyogenes aureus, and the typhoid bacillus, found their vitality to be destroyed by

Bichloride of mercury...	1 to 500	in exposures of	10 seconds.
,, ,, ...	1 to 1,000	,,	45 ,,
,, ,, ...	1 to 2,000	,,	90 ,,
Nitrate of silver ...	1 to 10	,,	4 ,,
,, ,, ...	1 to 50	,,	8 ,,
Carbolic acid ...	1 to 100	,,	12 ,,
,, ,, ...	1 to 20	,,	15 ,,
,, ,, ...	1 to 60	,,	4 minutes.
Permanganate of potassa ...	1 to 50	,,	20 seconds.
,, ,, ...	1 to 100	,,	1 minute.
,, ,, ...	1 to 200	,,	5 minutes.
Chlorinated soda ...	fresh solution	,,	4 seconds.
Labarraque's solution...	1 to 2	,,	8 ,,
,, ,, ...	1 to 10	,,	45 ,,
Hydrogen dioxide ...	fresh, and below 60° F.	,,	1 minute.
Listerine	undiluted	,,	1 ,,
,, ...	1 to 2	,,	8 minutes.
Iodoform dissolved in ether ...	1 to 10	,,	5 to 7 ,,
,, in dry powder ...	... ...	... ...	12 hours.

Of the various operations which have been employed in the treatment of conical cornea, our author prefers excision of the apex by a Græfe's knife and scissors, and closure of the wound by fine sutures obtained by unravelling twisted silk. "The whole corneal tissue is included, and the stitches must come out in two days. There need be no prolapse of iris, and the scar may be very small."

Mules's operation—evisceration, and the introduction of a hollow glass sphere—is noticed but not commended; it is attributed by an error to Mr. Snell.

"Iridavulsion denotes total removal of the iris by tearing it from its periphery. . . . I have found it have a remarkable effect in two cases of hydrophthalmus. The whole iris may be drawn out with a hook, or by forceps, or by both in succession."

In describing the anatomy of the crystalline lens Noyes perpetuates an error which for many years past has been handed down from one text-book to another:—"Its axial thickness is from 3·6 mm. to 4·7 mm." This dimension is considerably too small even for the lens of the young adult, and much more so for that of middle and advanced life.

In connection with the treatment of cataract, the following passage is of interest:—"Shall the operation be done upon one eye while the other is perfectly good or has useful vision? For soft, including traumatic, cataract, the answer would be yes, because it involves little risk; for hard cataract there is a difference of judgment, but my own practice is in favour of it. I admit that some have been annoyed by squint and have complained of confusion of sight, but the greater number have enjoyed real benefit. The gain is in the enlargement of the field of vision, in the stronger mental impression, because of a greater impulse of light stimulus to the central ganglia, and because, notwithstanding the correcting glass was not worn by the operated eye, a degree of stereoscopic vision may be secured which the patient finds of great advantage."

Extraction of cataract without iridectomy will, in future, in the author's opinion, be the proper operation for the larger number of cases, and this opinion is backed by an

indictment of iridectomy graver, we think, than is quite justifiable :—"The dark side of the operation with iridectomy is the large contingent of cases of irido-cyclitis, and more profound inflammations which result in grave, if not entire loss of sight." By what statistics can he show that the omission of iridectomy enables the surgeon to increase his percentage of successful cases ?

Among the last and best chapters in the book is one of forty pages dealing with diseases of the orbit, in which, among remarkable cases of wound and injury, we find the extraordinary one in which the breech-pin of a gun barrel, a heavy piece of metal more than four inches in length, broke through the nose and the roof of the orbit, passed deeply into the brain, and remained completely hidden, its presence being unsuspected until the patient came under the notice of Professor Noyes five months later.

The volume concludes with a short chapter on statistics of eye diseases ; a "bibliography," the various items in which are placed in chronological order (we may note in passing that the *Ophthalmic Review* is not, and never has been, published in Manchester) ; a very full index ; and three pages of well-drawn coloured illustrations of the fundus oculi.

We have ventured to point out some weak points in Professor Noyes's work ; its value and importance will be obvious to every reader.

Otto Schirmer (Göttingen). Pathology of Zonular Cataract. *Von Græfe's Archiv. XXXVI.*, 1., *p.* 185.

In his former paper (*vide O. R.*, Feb., 1890) Schirmer asserted that the globules in the nucleus of zonular-cataracts were not post-mortem products, as assumed by Beselin, and he now brings forward a case to prove his assertion. The patient was a boy aged five, with zonular and anterior polar capsular cataracts in both eyes. Modified linear extraction was done on both eyes after an unsuccessful discission had been done on the left.

Needle preparations of the left lens showed normal fibres in the transparent cortex, and numerous globules in the cataractous zone, the globules so far as observed between the fibres. The fibres of the opaque zone irregular in outline, showing outgrowths which Schirmer considers to be the above-mentioned globules, and to be really external to the fibres. The fibres of the nucleus similarly affected.

The right lens was not examined till after hardening. The opaque zone was visible in unstained sections, and consisted of a mass of small round and irregular globules lying between the fibres. An external band of vacuoles surrounded the actual cataractous zone, and this corresponded to a veil-like opacity which had been observed during life.

The preparation exhibited the same peculiarity when stained with hæmatoxylin that was seen in one of the cases previously reported. The contents of the vacuoles stained deeply in the cataractous layer, while the similar bodies in the rest of the section remained unstained—a behaviour which probably depends upon some chemical difference.

Two points of Schirmer's theory are demonstrated completely in the above paper : one that the vacuoles are not produced by hardening agents, but exist in the recent lens ; and the other that the layer of vacuoles exactly corresponds in size and position to the opaque zone seen both before and after extraction.

J. B. S.

Beaumont (Bath). The Shadow-Test in the Diagnosis and Estimation of Ametropia. *London, H. K. Lewis*, 1890.

In this monograph of 38 pp. the author, who has evidently paid great attention to the subject, gives a brief account of the practical use of the shadow-test, which term he considers preferable to retinoscopy, or any of the numerous names which have been given to this method of estimating the refraction. He omits, unwisely as it appears to us, any optical explanation of the method, or of the movement of the shadow which occurs in the different forms of ametropia, "with a view to make the book as practical as possible." Nevertheless, after this statement in the preface, he begins by a chapter which is almost entirely concerned with an historical account of the method. In Chapter II., the use of the concave in preference to the plane mirror is advocated, and it is stated that it is "preferred by most ophthalmologists." This we are inclined to doubt.

The author wisely warns his readers of the danger of using the shadow-test to the exclusion of other more important methods of examination, and he also emphasizes the necessity of ascertaining the refraction at the macula, and not at other portions of the fundus oculi; and gives some tables of figures as to the differences in refraction at the yellow spot, and at the periphery. Emmetropia is spoken of as "the narrow line which divides hypermetropia from myopia; the border which separates the haven of the former from the pitfalls of the latter, the no-man's land in which vision is injured by plus as well as by minus lenses." The feeling of satisfaction which is aroused in an emmetrope on perusal of the lines just quoted is somewhat qualified by a sentence which follows, viz., that "it (emmetropia) is a condition of the refraction too dangerously near myopia to be desirable."

In regard to the use of mydriatics in cases in which the shadow-test is to be used, the author differs from most authorities. We gather that he considers it more essential to paralyse the accommodation in myopes than in hypermetropes.

There is some reason for this opinion, however, inasmuch as there is a danger of over-correcting in myopia, whereas in hypermetropia the error, if there be one, will be that of under-correction.

The statement that "three or four days" are required for the effect of homatropine on the ciliary muscle to pass off is unusual, unless the drug be used frequently, and in strong solution ; twenty-four hours are generally sufficient.

The book is well printed ; but for so small a publication there is a noticeable lack of clearness of expression, and there are several grammatical errors.

WYNTER AND WETHERED (London).—A Manual of Clinical and Practical Pathology. *London: J. & A. Churchill.* 1890.

The authors of this manual have earned the thanks of all those desirous of working at the pathological anatomy of the eye by inserting a chapter of 25 pages describing the methods employed in such examination. They have been fortunate in securing for this purpose the services of Mr. E. Treacher Collins, Curator of the Museum of the Royal London Ophthalmic Hospital, Moorfields. It would be out of our province to deal with other portions of the book, but we may express the opinion that this chapter materially enhances the value of the work.

The opportunities afforded to the Curator at Moorfields of studying the pathology of the eye, and of experimenting with different methods of research, are unrivalled, at least in this country ; and Mr. Collins has given detailed directions which cannot fail to be of value to those who are desirous of investigating this special branch of pathology. The chapter is clearly and succinctly written, and we have pleasure in recording our appreciation of his work. With the exception of a few evident slips, chiefly printers' errors, we have no fault to find with it. The preparation of

macroscopical specimens, so useful for teaching purposes, is described in considerable detail; and those who have seen the very fine collection of such specimens now in the Moorfields Museum will probably be of opinion that the space devoted to this part of the subject has been wisely utilised.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Friday, July 4th, 1890.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

Concussion of the Eyeball giving Rise to Acute Local Symptoms of Congenital Syphilis.—Dr. Adolf Bronner (Bradford) recorded three cases in which concussion of the eyeball in patients with congenital syphilis had given rise to interstitial keratitis and peripheral choroiditis. 1. A girl aged 14 was hit on the left eye with a shuttle at the mill. Interstitial keratitis set in, and seven months afterwards the cornea of the right eye became similarly affected. 2. A man aged 22 was struck on the left eye with a piece of coal. The cornea was steamy the next day, and typical syphilitic interstitial keratitis set in, and in ten days the right cornea was also affected. In this case there were brown-black patches of choroidal pigment in the periphery of the fundus. 3. A boy aged 9 was struck on the left eye with a dart. Three weeks afterwards he noticed that he could not see so well with that eye. The cornea and media were clear, but there was a patch of choroidal absorption near the macula and peripheral choroiditis. Dr. Bronner said that, from a legal and also therapeutic point of view, it was important to know if concussion of the eyeball could cause a local outbreak of latent congenital syphilis. He thought that this did occur frequently, but was overlooked.

"*Cephalic Tetanus*" *following a Penetrating Wound of the Orbit.*—Dr. Rockliffe (Hull) recorded this case. A boy aged 7 received a slight penetrating wound of the left orbit from a fall. Two small pieces of thorn suppurated out on the seventh day. On the tenth day he complained of stiffness of the left face and neck, which was followed by spasmodic contractions of the left side of the face, complete right, partial left ptosis, with flattening of the left side of the face, and inability to open his mouth. The wound and orbit were explored and thoroughly washed out with perchloride of mercury solution ; the spasms, which disappeared under chloroform, continued to increase, and became more general, even to opisthotonos, until the twelfth day, when they began to decrease, and entirely ceased in three weeks. The facial paralysis, ptosis, and inability to open the mouth remained for some weeks afterwards. Twelve weeks after the accident the only symptoms were slight drooping of the left lid and diplopia on convergence, both of which were decreasing.

The President asked if paralysis of the portio dura was at all usual in cases of tetanus. He did not remember to have seen a case.

Pyœmic Panophthalmitis.—Dr. Rockliffe read notes of a case occuring in a patient aged 30, who miscarried in the sixth month of her fifth pregnancy, and subsequently suffered from septic poisoning. The ocular symptoms commenced on the thirteenth day, and the vision was completely lost in forty-eight hours ; suppuration of vitreous took place, and there was considerable proptosis of both eyes, due to suppuration in the orbits. She also had ischio-rectal abscess, and abscess of the left forearm. In a month the suppuration in the orbits ceased, and both eyeballs shrank. The patient regained her general health in three months. The ocular inflammation was considered to be probably embolic in its origin.

Note on the Operative Treatment of Scleral Wounds.—Dr. George A. Berry (Edinburgh) communicated a paper on this subject, in which he drew a contrast between the course of perforating wounds of the sclera as compared with similar injuries to the cornea. The more unfavourable ter-

mination of the former he attributed to greater liability to infection, owing either to the imperfect apposition of the lips of the wound, or to the absence of that copious outpouring of lymph or gush of aqueous, which carried away micro-organisms when the cornea was wounded. He considered the most effectual treatment consisted in thoroughly washing with corrosive sublimate solution, and then detaching and stretching the conjunctiva across the opening in the sclerotic, a method analogous to that of converting a compound into a simple fracture. He was averse to direct suturing of the sclera on account of the risks and complications it introduced, and considered it practically impossible to keep a wound in the conjunctival sac aseptic by means of lotion or dressing. It was usual for him to remove a portion of conjunctiva on one side of the wound, so that the suture subsequently introduced might not lie directly over it. Any portion of prolapsed vitreous might be snipped off after the introduction of the stitches and before they were drawn together.

Acute Cellulitis of the Orbit with a Fatal Result.—Mr. Simeon Snell (Sheffield) recorded this case, occurring in a girl of 14, and following a swelled face due to carious teeth. Two teeth had been removed from the upper jaw on the corresponding side, and subsequently, while the face was still swollen, the patient, had been for a drive on a cold day in an open trap. When seen a fortnight later there was great swelling of the lids on the right side, with proptosis and œdema of the conjunctiva. There was apparently no affection of sight, but ophthalmoscopic examination was not possible beyond that which sufficed for the observation that the media were clear. There had been pain in the orbit, with headache and vomiting. Three days later a considerable quantity of pus was let out by an incision through the inner third of the lower lid. This afforded great relief, and the eyeball resumed its normal position. Two days later, however, the patient was much worse ; there was great pain extending to the occiput, with vomiting and retraction of the head. She became comatose and died the following day. There were no convulsions, but the pain in the head was complained of as long as she

remained conscious. The condition of the orbit appeared quite satisfactory, and the drainage tube had been removed. A *post-mortem* examination was not allowed. It was ascertained that at the extraction of two teeth from the upper jaw there was a discharge of very fœtid pus, and the bone immediately around the roots was necrosed, the gum being inflamed and turgid. The teeth were badly decayed, the dentine being thoroughly softened. There could be no doubt that in this case the condition resulting from the carious teeth was the immediate cause of the necrosis and orbital cellulitis. Mr. Snell referred to two somewhat analogous cases which he had seen, one published in the *Ophthalmic Review*, 1882, the second in the current number of that journal.

Cases of Symblepharon treated by a Skin Flap.—Mr. Edgar Browne (Liverpool) reported two cases: (1) Symblepharon resulting from injury by caustic liquor. The conjunctiva was shrivelled and completely avascular. A narrow flap of skin from the cheek was brought through a buttonhole in the lower lid, and stitched to the eyeball. (2) Symblepharon following a burn. A similar procedure was adopted. In both cases the result was satisfactory. Mr. Browne recommended the operation only as a last resource, after such measures as transplantation of conjunctiva had failed. He referred to a similar operation advocated by Prof. Snellen at a recent meeting of the Society, and mentioned that his first case was operated on in Nov., 1878, his second in Jan., 1889.

Mr. Silcock said he had performed the operation in question, and had shown the case before the Society. He could not speak of it in such glowing terms as did Professor Snellen. There was much thickening of the skin flap, which had not subsided after the lapse of some months.

Card Specimens.—Mr. Brailey: Result of operation for immature cataract.

Mr. Stanford Morton: (1) Foreign body beneath semilunar fold; (2) Aneurysms of retinal arteries.

Mr. Holmes Spicer: Congenital dislocation of lenses.

Mr. W. Edmunds: Retinal changes in leucocythæmia.

Mr. Lawford : Ophthalmoscopic drawing of embolism of a retinal artery.

Mr. P. Wells : Subhyaloid macular hæmorrhage.

Mr. Doyne : (1) Perforation of cornea and lens by a chip of steel without subsequent opacity of lens ; (2) Atrophy of retina.

Mr. Gunn : (1) Lymphatic nævus of conjunctiva with microphthalmos ; (2) Persistent mydriasis and peculiar cataract following wound of globe.

Mr. Adams Frost : Congenital abnormalities of optic disc.

Annual General Meeting.—This was held at 9.30. The report of the Council was read by the Secretary.

Its adoption was proposed by Mr. Tweedy, seconded by Mr. Doyne, and carried.

A vote of thanks to the retiring President and the members of Council, proposed by Mr. Nettleship and seconded by Dr. W. J. Collins, was carried unanimously.

The following are the names of those gentleman elected at the meeting who did not hold the same office during the preceding year :—

President : Henry Power.

Vice-Presidents : J. Hughlings Jackson, F.R.S. ; James Bankart (Exeter).

Members of Council : Herbert W. Page, Henry Eales (Birmingham).

AMERICAN MEDICAL ASSOCIATION.

Section of Ophthalmology.

Meeting at Nashville, May 20, 21, *and* 22, 1890.

Chairman, S. C. Ayres, M.D., of Cincinnati.

The address of the Chairman, on opening the meeting, referred to the rapid progress of our art, and the share in it of the work of American ophthalmic surgeons. We all felt grateful to those who collate the observations made on large

numbers of cases, commonly in public institutions. But each surgeon would find it of great value to have the records of his own clinical work effectually collated and sifted. A classified register enabling one to readily recall his cases of especial scientific interest would enable him more frequently to make those brief records of unusual conditions that constitute a very important part of our professional literature.

Among recent advances one of the most important was the supplanting of the modified Græfé extraction by the new, or old, simple extraction. The superiority of the latter operation for most cases, not all, is now well demonstrated. One of the oldest of antiseptics—mercuric chloride—is, in his experience, one of the best for topical application to the conjunctiva. In granular conjunctivitis, a solution of 1 to 500 may be brushed on the inner surface of the lids, though for a daily application a weaker solution is preferable. It is also satisfactory in the treatment of phlyctenular conjunctivitis. But for purulent conjunctivitis it is doubtful if it acts any better than solutions of silver nitrate.

The Use of Jequirity.—Dr. Wm. Cheatham, of Louisville, believed that from the exaggerated hopes entertained of this drug, and the subsequent reaction against it, it had not yet taken its true place in the treatment of trachoma with pannus. Living in a region where such cases were common, his experience showed that many cases of blindness from pannus, quite hopeless of improvement by other methods of treatment, could by the use of jequirity be given very useful vision. He used it in the form of an impalpable powder, prepared by thoroughly pulverizing the bean, and repeatedly sifting through fine bolting cloths. In this form the drug may be kept indefinitely without liability to deterioration, and it is very much more manageable as to the effect produced. Its action is not only limited to the part of the conjunctiva on which it is placed, but it seems to produce much less disturbance of the deeper tissues than does the infusion. The lid is to be everted, have the powder placed upon its surface, and then be returned to its normal position, with as little disturbance of the powder as possible. Reaction with considerable pain comes on in from two to four hours, but is speedily controlled by washing out

and bathing the eye with hot water, to which may be added borax or carbolic acid.

Dangers in the Use of Jequirity, heretofore unmentioned.—Dr. T. E. Murrell, of Little Rock, used it in infusion. There can be no question as to its markedly beneficial effects in some cases. But, in addition to the dangers generally recognized as attending its use, he had seen it set up iritis, so that when the cornea cleared it revealed posterior synechiæ. In three cases under his observation, the inflammation had extended to the tear passages, setting up a dacryocystitis, and leading to stricture of the nasal duct. He would think well of the use of the powder.

Dr. J. H. Thompson, of Kansas City, found many cases of pannus that clear up under applications of copper sulphate. Jequirity will not cure all cases. He used it rather to change the character of the inflammation, and render the case more amenable to treatment by copper, or silver nitrate.

Dr. G. C. Savage, of Nashville, thought that the treatment of granular conjunctivitis by everting the lids and destroying the granulations by a brush would do away with the need for the use of jequirity, and the prolonged use of the strong mineral astringents.

Dr. X. C. Scott, of Cleveland, had a large experience with the treatment of trachoma. He would be sorry to give up jequirity, which he had heretofore used in infusion. It would not cure the cases alone, only started them on the way to recovery, and other remedies must be used with it. But with it the cure was effected in one-third to one-fourth the time required without it.

Dr. J. F. Fulton, St. Paul, found that jequirity had its own field of usefulness, in which it gave most brilliant results in otherwise hopeless cases. It seemed most beneficial where with pannus the conjunctiva was comparatively devoid of secretion, and the case tended to remain indefinitely in the same condition.

Dr. Cheatham, replying to a question, stated that he applied it as often as four or five times in some cases, repeating the application as soon as the resulting inflammation had fairly subsided, usually in eight or ten days.

Functional Nervous Diseases.—Dr. A. R. Baker, of

Cleveland. The field claimed for reflex neuroses is a broad one. It is, however, demonstrated that vertigo and certain allied disorders of the nervous system are very closely connected in some cases with strain of the ocular muscles. The diagnosis of muscular insufficiencies is difficult. It is facilitated and rendered more reliable by placing the eyes under the influence of atropin. The diplopia-prism test is better than the Græfé test, of covering one eye and watching it for divergence and subsequent recovery. Perfect balance of all the opposing ocular muscles is rare. But lack of balance only requires treatment when it gives rise to symptoms of strain, or some reflex neurosis. Many cases are greatly benefited by wearing prisms, although there may be some difficulty at first in becoming accustomed to them.

In cases experiencing relief from the use of prisms tenotomy is indicated. In all of the cases there will be found an underlying neurotic tendency, so that when the pain located in one part of the body is relieved it will make its appearance elsewhere. It is the underlying general neurotic condition that is the real cause of these cases of nervous disease of reflex origin.

Dr. F. C. Hotz, of Chicago, found many of the apparent muscular faults were relieved by correcting errors of refraction. But tendencies to vertical deviation can hardly be connected with strain of accommodation. And when other measures failed to give relief, and the correction of a hyperphoria does give it, we must regard that condition as the cause of the symptoms.

Dr. Savage thought no operation should be done unless the tendency were strong enough to cause actual diplopia.

Dr. Frothingham had reported three years ago (see *O. R.*, 1887, p. 245) a case of epileptiform seizures cured by the correction of hyperopia. Up to the present time the has remained free from any such seizure. But since her case was reported she consulted a surgeon, who devoted himself largely to heterophoria, who has operated on her eye welve times, with the result of a decidedly weakened power of adduction.

Dr. Connor had not found that partial tenotomies cause

any permanent improvement in the balance of the ocular muscles. He encountered many cases of disordered muscular balance, that at first promised to be proper cases for operation; but the correction of the co-existing errors of refraction and the careful treatment of the general system generally cured the symptoms that might have been taken as indications for an operation. These cases are of a neurotic temperament.

Dr. de Schweinitz had frequently found heterophoria co-existent with chorea, epilepsy, and other neuroses; but it was not more frequently associated with these than it was with a condition of health. It should not be forgotten that disordered reflexes indicate defective control of the higher centres.

Sympathetic Inflammation two weeks after Enucleation of the Injured Eye.—Dr. George H. Goode, of Cincinnati, reported this case.—The exciting eye had recently been lost by a blow from a stone. It was still irritable, but not in an alarming condition. Enucleation was decided on, because it was doubtful if the patient would continue under competent observation. After enucleation all went well until the end of the second week, when the patient returned with iritis with synechiæ, and keratitis punctata. Under treatment the eye improved with a single relapse. Vision has risen to $\frac{20}{60}$, and the ophthalmoscope shows no lesion of the fundus.

A Simple and Reliable Astigmometer.—Dr. F. C. Hotz, of Chicago, had found the shape of the retinal image of a point of light a speedy test for astigmatism, requiring no great power of accurate observation on the part of the patient. The instrument used consisted of a metal plate with an index that rotated over a graduated semi-circle. Two small openings in the plate give two points of light. In astigmatism these points appear as lines or ellipses, and on rotating the plate until the directions of the long axes of these ellipses lay in the same line, the index indicated the angle of one of the principal meridians of astigmatism. The degree can easily be ascertained by spherical lenses. Using the test at fifteen feet, one-half dioptre of astigmatism is always shown. The test was not presented as new, but as one

which the experience of eighteen years had shown most valuable and universally applicable.

Minor Lesions in the Macula Lutea.—Dr. G. E. de Schweinitz, of Philadelphia, referred to the well-known causes of macular disease—local and general—and then introduced the subject of small lesions in the macula lutea, for the existence of which it was not possible to state, definitely, either an ocular or a constitutional cause. These lesions are of an apparent diameter of 3 to 4 mm., faintly yellow in colour, and occasionally dotted with small pigment flecks ; or are composed wholly of collections of minute yellow or dark granules occupying an area of the size mentioned. They produce no depreciation of central vision. Dr. de Schweinitz divided them into two classes—symmetrical and asymmetrical—and sub-divided them into several groups; (1) asymmetrical lesion in the eye presenting the greater error of refraction ; (2) symmetrical lesions, symmetrical refraction error ; (3) asymmetrical lesion in the eye presenting the smaller error of refraction ; (4) symmetrical lesions, asymmetrical refraction error, probable constitutional cause. The question of the relation of these spots of degeneration to the error of refraction was discussed, and the insufficiency of this explanation to account for all cases pointed out. In those cases where the lesions were symmetrical and constitutional disturbance existed, it was suggested that a transient albuminuria might exist, and the difference between these types of macular disorder and the macular retinitis the result of chronic interstitial change in the kidney was demonstrated. The paper closed with a report of a case of macular disease, the result of exposure to strong sunlight. The pathological anatomy of the lesions in general was obscure, but the suggestion was made that they represented small spots of choroidal degeneration in an area supplied by a single capillary loop, which had become occluded through disease ; the extent of the degeneration, however, not being sufficient to damage the retinal elements and produce depreciation of central vision.

Drs. Cheatham and Murrell had seen cases of central scotoma with macular lesion after eclipses, and after the transit of Venus.

Dr. Randall had been much interested in the group of cases referred to ; they were characterised by the normal central vision, and the absence of any tendency to extension of the choroidal change.

The Correction of Low Degrees of Astigmatism.—Dr. T. E. Murrell, of Little Rock, found it difficult or impossible to draw a line separating normal from abnormal astigmatism. He found that the more he made a practice of correcting low degrees of ametropia, the fewer cases there were to record as suffering from ocular neuroses, irritation of the retina, etc. In correcting the lower degrees, it is of especial importance to have the correction perfectly accurate. He had seen one-third of a dioptre of uncorrected astigmatism cause serious trouble. By experience he was also more and more convinced of the importance of using a mydriatic to ascertain the kind and amount of ametropia ; and that using the correction found necessary with the mydriatic will in the end give the most complete relief. As a mydriatic he had tried homatropine, but, finding it unreliable, had gone back to the use of atropine.

Dr. L. H. Taylor, of Wilkesbarre, had also, after trial of the newer mydriatics, returned to the use of atropine.

Dr. Randall found that in the mass of cases it was necessary to use a mydriatic, and of those in use he had found hyoscyamine the most satisfactory.

Dr. G. C. Savage, Nashville, would use a mydriatic in every case of refractive error, under forty years of age. (!) He used principally homatropine, instilling a solution of 1 to 60, one drop every five minutes until ten drops had been instilled. He would fully correct all ametropia found. (!)

Dr. Hotz had found homatropine serviceable and reliable.

Dr. Lippincott found the use of the correction for low degrees of ametropia often gives great relief. And even if the glasses were subsequently laid aside without inconvenience, the aid they gave was no less beneficial because the need for it was not permanent.

Transplantation without Pedicle for Cicatricial Ectropion.—Dr. J. Morrison Ray, of Louisville, reported a case of blepharoplasty by Wolfe's method, where an injury by explosion had left only the free border of the upper lid.

The graft was taken from a space three inches long by one and three-quarters wide on the inner surface of the arm, opposite the belly of the biceps. Both graft and the freshened surface were flooded with a warm solution of mercuric chloride. No stitches were used, the flap being supported in position by gold beaters' skin, which was changed on the fifth day, and finally removed on the ninth. On the twelfth day desquamation occurred for a space one-sixth of an inch wide around the margin. The final result was an area of good tissue, about one inch long by three-fourths wide, obtained by the operation. The points essential to success were, to see that all hemorrhage has stopped, and to remove all subcutaneous fat from the graft before placing it in position.

Dr. Hotz preferred to transplant neighbouring tissue with pedicle, when it can be done. The thicker skin of other parts makes a rigid lid not properly movable ; while the thin skin covering a cicatrix is well adapted to such a use. If that were not practicable, he would prefer the method of Prof. Tiersch, of using large skin grafts.

Tests of Visual Acuteness and the Standard of Normal Vision.—Dr. Edward Jackson, of Philadelphia, urged that variability and indefiniteness in our standard tests of visual acuteness are incompatible with scientific accuracy. The different letters of the alphabet vary greatly in legibility, some can be recognised at twice the distance of others of the same size ; and slight changes in the form of the same letter change its visibility greatly. As the individual letters employed, and their shapes, vary on the different test-cards, visual acuteness as obtained by these different tests is not accurately comparable, even though the tests are all on the Snellen five-minute basis. When diffuse daylight is depended on as the source of illumination, the variations in brightness of illumination are a source of even more serious error. By a good illumination the Snellen standard is decidedly below the average of normal vision, and doubtless leads to the acceptance of imperfect corrections of ametropia in many cases, where a higher standard should be reached.

Variability of illumination is practically avoided by the use of artificial light. The speaker used that from an argand

gas burner one foot in front of the test-card. To get a fixed standard of visual acuteness we must give up letters and resort to some definite mathematical figure. The figure proposed is a square, of such size as to subtend an angle of three minutes; the bounding line being one-third the width of the square; and having a part of the same width omitted on one side. It is used by requiring the patient to indicate the side from which the portion is omitted. One of these test figures on a round or square piece of cardboard, so that it can be turned in any direction, is a convenient pocket-test for visual acuteness. Such a figure would not entirely replace the use of test-type, but if vision was recorded as found by this test the records obtained would be more accurate, and would not present the anomaly of a majority of all eyes possessing better than perfect vision.

Dr. Randall called attention to the advantage of artificial illumination of the test-card, in the lessened irradiation with the yellow light.

Homonymous Hemianopsia.—Dr. R. Tilley, of Chicago, reported a case of left lateral homonymous hemianopsia, associated with wound of the occipito-parietal region of the right side of the head. The external injury was trifling. The patient had walked a block after receiving it, and had been found lying unconscious some hours later; and did not fully recover consciousness for ten days. The left pupil was larger than the right, but the history showed that this had been so for years before the injury. The field was limited by a line vertical, except that it bent a little to the left around the fixation point.

Hemorrhage after Cataract Extraction.—Dr. C. R. Holmes, of Cincinnati, reported a case in which both eyes were myopic and presented black cataracts. The right had the lens extracted, did well, and obtained ultimately vision $= \frac{20}{150}$. Two weeks after the right, extraction was done on the left eye. Iridectomy was done in both. There was a little bleeding at the time. Two hours after the extraction of the left lens, severe pain was felt in the eye, and there was vomiting. The next morning the bandage was saturated with blood and the vitreous extruded. The

oozing continued for five days. At the end of six weeks the stump was still tender.

Boracic Acid and Massage in Pannus.—Dr. Holmes had found this method of treatment most satisfactory in both acute and chronic cases, the improvement being usually rapid. In trachoma without pannus it was not satisfactory. The treatment consisted in dusting powdered boracic acid on the everted lids, after the use of cocaine; then inverting the lids in such a way as not to disturb the powder covering them; and performing gentle but thorough massage of the closed lids.

Disputed Points in the Correction of Refraction-Errors.—Dr. B. A. Randall, of Philadelphia, claimed that, although the showings of the school-examinations, proving a great preponderance of ametropia to be the rule, have now been generally accepted, the facts have not been accorded their due weight in practice. Em. is a rarity, and only a fraction of those having refraction-errors need correcting glasses. This is the case not only with children, but also with adults, for the claim that H. is outgrown rests almost wholly upon baseless assumption. When low Am. is counted, as it should be, and adequate methods are used to uncover it, the great majority of any group of eyes will be found ametropic. A mydriatic is often necessary to thus uncover it; but the claim that the refraction so found is fictitious, and not the true static refraction, needs only a careful study for its overthrow. 1 A small number of cases show no change of refraction under full mydriatic paralysis. 2 Myopes, though notoriously prone to "spasm of accommodation," almost never show any "tone." 3 A large proportion of cases soon learn to wear totally correcting glasses with full distant vision. (A table of such cases was appended.) It is usual that a hypermetrope finds difficulty at first in seeing clearly at a distance with a total-correcting glass; but if this persists for more than a fortnight, it is almost invariably because a muscular anomaly has been left uncorrected. When the muscles have been properly studied as a routine part of the first examination, these cases will be foreseen, and the under-correction by 25 or 50 D., or the prismatic correction (often by mere

decentering) will prevent trouble. It is rarely necessary to wait until the mydriatic has passed away before ordering the glass. Scrupulous care as to the centering and fit of glasses is always needed. As a mydriatic, he gave decided preference to hyoscyamine, since in 5 per cent. sol., it is more powerful than atropine 1 per cent., maintains its paralysis unvaried for seventy-two hours as a rule, after the last instillation, and is but two days more in passing off. As the enforced rest is one of the most important elements in the use of a mydriatic, and the period of returning accommodation is always one of discomfort, this has special value, as its effect lasts but half as long as atropine, yet gives total rest for a longer time. The general principle is insisted upon that the true static refraction should be determined with all possible accuracy, and the full correcting glass given in every case except when good, *definite cause* calls for its modification.

Dr. Jackson called attention to the fact that the glass giving the best vision at fifteen or twenty feet was not exactly the full correction, but for hyperopia, an over correction of 0.25 D. And an over correction of that kind is never satisfactory to a person who has perfect distant vision without glasses. But bearing this in mind and making the proper allowance, the rule to give the real "full correction" for distant vision, as determined with a mydriatic, was one from which it was rarely advisable to depart. In partially latent H. there will often be some annoyance at first, but a prior warning and the proper encouragement will get most patients to put up with it. And this period of annoyance is not escaped, often not lessened, by giving only a partial correction.

Acquired Astigmatism.—Dr. G. E. Frothingham, of Detroit, reported as static lenticular astigmatism, acquired by the long-continued use of spectacles having a faulty position, the case of a young man, whose eyes repeatedly measured under atropine showed H. 0.75, and no astigmatism; with normal vision. After four years, during a considerable part of which time he used 3 spherical lenses so placed that he looked obliquely through them, he was found to have astigmatism requiring a + 0.62 cyl. lens for

its correction. It was shown that such an astigmatism would be required to compensate for the faulty position of his glasses, and their effect on the pencils of rays passing obliquely through them.

Method of making Sections of the Eye.—Dr. J. H. Thompson, of Kansas City, described a method of saturating the tissue with paraffine, and showed some very fine sections produced by this method. The globe is frozen and a slab cut from the lower side so that it will rest accurately on a piece of glass, and a second slab cut from the top making sure that the anterior chamber is opened by one of these cuts. The globe is then hardened in Mueller's fluid, and transferred, through dilute and absolute alcohol, to turpentine. After thorough soaking in the turpentine, the temperature is raised to 130 or 150 Fahr., and paraffine is dropped into the turpentine, until the tissue becomes thoroughly saturated with melted paraffine. It is then allowed to cool, embedded and cut.

Sarcoma of the Choroid.—Dr. A. G. Sinclair, of Memphis, reported a case of this kind in a man aged 46. The sight had been lost three years before, and the symptoms when he presented were those of glaucoma. An iridectomy was done, giving temporary relief; but the symptoms recurring, the eye was enucleated, and found to contain a small spindle-celled sarcoma of the choroid. There had been no return in three years.

Tobacco: Its Effects upon the Eye-sight, was the subject of a paper by Dr. F. B. Tiffany, of Kansas City.

New Instruments, etc.—Dr. R. Tilley exhibited an instrument for measuring the radius of curvature of lenses. It consisted essentially of three points, two of them fixed, the third, situated half way between the others, movable. The latter was connected with an arm which indicated the curvature of the lens to which it was applied. Dr. J. A. Lippincott, of Pittsburgh, showed a form of fountain syringe for injecting the anterior chamber, and called attention to its value in the treatment of hypopyon. Dr. F. T. Smith, of Chattanooga, showed a convenient pocket case for the ophthalmoscope.

A FORM OF XEROSIS.*

By Charles W. Kollock, M.D., of Charleston, S.C.

A rather peculiar form of this disease is prevalent among negro children in Charleston, S.C. These children are for the most part scrofulous, emaciated, and generally miserable in appearance. At first sight the examiner is attracted by the pigmented condition of the conjunctiva as seen through the palpebral fissure. It has a dirty-white and yellowish-green hue that gives the eye a most disagreeable appearance. The portion of the conjunctiva visible between the lids is darker than the rest, and generally thicker near the corneal margin. The pigment is distributed well back into the retro-tarsal folds, but does not invade the palpebral conjunctiva. The ocular conjunctiva may be merely thickened and discoloured, and again, besides the discolouration, it is relaxed and flabby, so that every movement of the ball throws it into folds or wrinkles about the cornea, which folds are more noticeable laterally, but in some cases entirely surround the cornea. Occasionally these folds are capped by the silvery scales which some writers have described as being diagnostic of hemeralopia, and indeed the parents of a few of the children have mentioned night-blindness as the sole cause of bringing them for treatment. The conjunctiva of the lids has never been found in a granular or contracted condition, but is generally in a state of passive congestion, and in no case has the disease been known to follow ophthalmia. The

* Paper read before the American Ophthalmological Society.

ocular conjunctiva is dry and scaly, and closely resembles in appearance the skin of the cavalla or pompino fish.

The condition of the cornea is extremely interesting. Frequently it is bordered by an ulcerating ring that is generally below the surface, but at times is slightly elevated above as a soft, greyish ridge. This ulceration has never been seen to encroach further on the cornea, though the circle is sometimes broader at its upper and lower quadrants. The edges of the cornea are always hazy, whether ulcerated or not, but the centre may or may not be clear. A bluish hazy sheen is a common condition, which, upon close inspection, is found to be due to a partially opaque state of the epithelium. In one of the most pronounced cases the corneal epithelium was in folds and ridges like the conjunctiva. It is doubtful whether the inner layers of the cornea become involved, but there is certainly no iritis. The eye is not painful, nor is there any photophobia; but on account of the low vitality of the majority of patients, and their ages (from one to eight or nine years), it was impossible to obtain accurate information about subjective symptoms.

Treatment was usually followed by beneficial results, and consisted principally in building up the weakened constitutions. It was found that as strength and tone improved so did the ocular symptoms, the cornea first showing the results of treatment by becoming clearer. Locally a weak ointment of the yellow oxide of mercury (gr. ½, vaseline ℥i) was effective, and at times, along with this, a collyrium of boric acid was used. Occasionally, when ulceration of the cornea was present, a solution of atropine (gr. i : ℥i) was instilled, but whether beneficial or not was uncertain. Improvement in the condition of the ocular conjunctiva was less rapid, moisture and contraction returning slowly, and the pigment remaining unchanged. There is no doubt but that good nourishing food and a change of air to where sanitary surroundings are unexceptionable would

in many cases bring about cures, for it seems more than probable that hereditary taint, poor hygienic surroundings, and bad food are potent causes of the disease. This form of xerosis is interesting from the fact that it has only been seen among negro children ; that there has never seemed to be reason to think it followed any attack of ophthalmia, but originated *de novo* ; that the conjunctiva is never contracted ; the cornea is more or less affected, but not destroyed ; and that under proper treatment recovery will take place. The accounts found in the books are very meagre, and none describe a form which is exactly similar. It more nearly resembles a type reported by Bitot and Blessig to have occurred among the lower classes of Russians, especially during Lent. It also bears resemblance to that seen to follow ophthalmia Braziliana, but has its points of difference from both of these.

BRITISH MEDICAL ASSOCIATION.

Fifty-eighth Annual Meeting, held at Birmingham.

SECTION OF OPHTHALMOLOGY.

D. C. Lloyd-Owen, F.R.C.S.I., President.

Wednesday, July 30th, 1890.

Discussion on Myopia: its Causes, Prevention, and Treatment.—Mr. Priestley Smith expressed his dissent from the view of many modern authorities, who hold that a moderate degree of myopia is to be considered as advantageous and indicative of a higher state of intellectual development. In his opinion myopia is to be regarded as an optical defect, while the tissue changes which so frequently accompany its higher degrees are distinct evidences of diseased conditions. Myopia is not the result of redundant growth, but mainly the expression of a weakness of the tunics, which give way under the strain of convergence during early life.

Myopia is to some extent hereditary, but all the predisposing causes are not yet known. The ill effects of badly-regulated school life are, however, universally acknowledged.

To prevent myopia, one must prevent children from using their eyes too long and too closely upon near objects, especially in bad light, and for this purpose it is important that school teachers should understand the mischief which may be done by overstraining of the eyes.

The treatment of myopia has two objects to fulfil:—

1. To remove the present inconvenience.
2. To prevent future deterioration.

In progressive cases all bookwork may have to be given up, perhaps for several years. When the myopia is stationary the same glasses should be given both for distance and reading, so as to make the range and region of accommodation as similar as possible to that of the emmetrope. In very high cases of myopia it may be better to encourage monocular fixation in reading than to maintain a laborious and injurious convergence.

The following propositions were submitted for discussion :—

(*a*) Myopia is always a defect, often a disease.

(*b*) It is entirely incurable, but largely preventable.

(*c*) Its progress can be, and often is, accelerated by improper use of the eyes, retarded by judicious interference.

Mr. Richardson Cross urged the necessity of impressing school teachers and school boards with the fact that myopia is largely due to the want of proper treatment of the eyes during schoolwork.

Mr. Eales opposed the view that myopia is never congenital, and gave a case in point.

Mr. Juler agreed with the previous speaker that full correction should be given.

Dr. Grossman drew attention to the frequency of corneal defects as a cause of myopia. He preferred to correct for long and short distance, giving two pairs of glasses ; if one pair only were given, it should be that for near objects. He regarded choroiditis generally as the result, and not the cause of myopia, and advised the use of neutral tinted glasses for outdoor wear in cases of congestive myopia.

Mr. Wray had also observed myopia as a congenital condition.

Mr. Snell and Mr. MacNamara urged the importance of instructing school teachers upon the possible prevention of myopia.

Dr. Bull (Paris) advised that different glasses should be given for distance and reading.

Mr. Cant mentioned another case of congenital myopia, and disapproved of full correction of myopia in children.

Mr. Hewetson observed that myopia occurred in the Aborigines of the Cook Islands.

Mr. Priestley Smith and Mr. Cross having briefly replied, Mr. Bell moved and Mr. Wray seconded the following resolution, which was adopted : "That the officers of the Ophthalmological Section communicate with the officers of the Ophthalmological Society of the United Kingdom with a view of making recommendations to the Educational Department for the control of the increase of myopia in Board Schools."

Blepharo-Cheiloplastic Operations for Entropion.—Dr. Arthur Benson described the operation as now done in St. Mark's Hospital, Dublin, and stated that no other operation had, in his experience, produced as good results.

The paper was discussed by Messrs. Snell, Eales, Juler, Story, Cross, Reeve, Cant, and the President. Dr. Benson also exhibited a new needle for electrolysis.

Detection of Colour-blindness with demonstration of a new Apparatus.—Dr. Grossmann pointed out the short-coming of Holmgren's method, and exhibited a new apparatus, the description of which will appear in full.

Prevention of Infantile Ophthalmia.—Dr. Grossmann referred to his former papers on the subject, and moved some resolutions. As the result of the discussion a sub-committee was appointed, consisting of Mr. Lloyd-Owen (President), Mr. Snell, and Dr. Grossmann—"To prepare a resolution to be presented at the next annual meeting, and to obtain, if possible, the aid of the Obstetric Section, with a view of bringing the subject before a general meeting of the Association."

Thursday, July 31st.

A New Syringe for Extracting the Cortex in Cataract Operations.—Mr. Cant exhibited a modification of McKeown's syringe, the nozzle of which is made very small and without a projecting lip. He uses this instrument in extraction without iridectomy, and has had good results in 40 cases.

The Treatment of Immature Senile Cataract.—Mr. McHardy recommended operative interference by a preliminary iridectomy, with trituration of the lens (*à la* Förster, by carefully, but boldly, rubbing on the surface of the cornea, while the aqueous chamber is empty) at any convenient time after the vision of the inferior eye has been reduced by cataract to less than $\frac{6}{24}$, and provided the sight of the second eye is judged to be failing distinctly from cataract. He finds it possible by the last-mentioned manœuvre to satisfactorily and safely ripen immature senile cataracts in from eight days to eight weeks. He prefers to allow an interval of not less than six weeks to elapse between the iridectomy-trituration operation and that for extraction

of the cataract. Giving way of the lens capsule is a very uncommon complication during the trituration ; some slight iritis is not infrequently discernible on the second or third day after the trituration, but may always then be successfully combated by atropine and cocaine. The artificially ripened cortex lends itself kindly to removal, and is not sticky.

In the discussion Messrs. Hill Griffith, Grossmann, Snell, Reeve and Panas expressed themselves generally as satisfied with the results of the method when applied to properly selected cases.

On the Value of Extracting Secondary Cataracts.—M. Panas (Paris) advocated the complete or partial removal of capsular cataracts and false membranes as producing better results than the ordinary proceedings of discission and iridotomy.

In the discussion, Messrs. Lloyd-Owen, Story, and Ruttle referred to the unsatisfactory results of operations generally in these cases, and welcomed M. Panas' contribution towards a more successful method of treatment.

Friday, August 1st.

The Treatment of Squint Amblyopia by Galvanism.—Mr. Wray pointed out the uselessness of treating these cases by occlusion, and gave the particulars of 10 cases treated by galvanism with more or less success. According to his experience, the prognosis in these cases is favourable if central fixation exists ; otherwise vision rarely improves beyond $\frac{1}{6}$ to $\frac{1}{4}$. He uses strong currents from one to three milli-ampères.

In the discussion, Messrs. Priestley Smith, Hill Griffith, Story, Eales, and Juler took part.

Diagnosis of Intra-ocular Growths.—Dr. Hill Griffith exhibited specimens of intra-ocular tumours, and referred to the difficulties met with in diagnosing various new growths.

Case of Monocular Hemianopsia.—Dr. Hill Griffith described a case where hemianopsia in the upper half of one field existed for several years unaccompanied by any other symptom, and with an absolutely normal fundus.

Mr. Eales suggested the possibility of a temporary

retinal thrombosis having produced a permanent loss of function in the affected eye.

The Quantitative Estimation of Defects of Colour Perception.—Dr. Edridge Green classified the possible causes of colour-blindness as follows :—(1) Absorption of certain rays by the optic media ; (2) non-excitability of the visual substance or nerve fibres by rays of a certain wave length ; (3) pathological conditions ; (4) defects of the colour-perceiving centre.

He dealt chiefly with classes 2 and 4, considered in the light of a theory of colour-perception recently advanced by the author.

Corneal Astigmatism, as affected by Tension.—Dr. Bull (Paris) had observed a shortening of the radius of curvature of the vertical meridian and a lengthening of that of the horizontal meridian of the cornea under the influence of pressure from the muscles of the eyelids.

Choice of Anæsthetics for Ophthalmic Operations, with special reference to the use of Nitrous Oxide Gas.—Mr. Eales advocated the use of nitrous oxide gas for short operations, it being free from the dangers of chloroform and from the injurious congestion of the head and face produced by ether.

Death in Cases of Cataract Extraction.—This paper, by Mr. E. Roberts, was taken as read.

TENTH INTERNATIONAL MEDICAL CONGRESS.

Held at Berlin, August 4th to 9th, 1890.

SECTION X.—OPHTHALMOLOGY.

(Reported by Dr. Grossmann.)

August 4th.—President : Prof. Schweigger (Berlin).

On the Management of the Capsule during and after Extraction.—Dr. Knapp (New York) advocated peripheral section of capsule in extraction of senile cataract. A secondary operation is necessary in many cases, and may be performed within two weeks of the primary.

Dr. Dufour (Lausanne) thought the interval too short, and preferred to omit the secondary operation if the vision obtained was fairly good.

Dr. Wicherkiewicz (Posen) also tried to avoid a secondary operation.

Dr. Keyser recommended removal of a portion of the capsule with a hook, after opening it.

M. Darien (Paris) followed M. Abadie in extracting the capsule by means of a forceps.

M. Gayet (Lyons), M. Haab (Zurich), Dr. Gruening (New York), and Prof. Schweigger took part in the discussion.

In reply, Dr. Knapp disapproved of secondary discission with either one or two needles.

On the Operative Treatment of Secondary Cataract.—M. L. Vignes (Paris) exhibited a new scissors for irido-capsulotomy, as performed by Wecker.

Dr. Fuchs (Vienna) called attention to the almost forgotten operation of dividing a secondary cataract from behind through the sclerotic and the vitreous.

The After-treatment of Cataract Operations.—Dr. J. J. Chisolm (Baltimore) advocated treatment by the application of strips of adhesive plaster to the operated eye only, the patient being kept in a light room.

Dr. Roosa (New York) disapproved of this method, and Drs. Gruening and Fuchs also spoke.

August 5th, Morning.—President: M. JAVAL (Paris).

Trachoma.—Dr. Raehlmann (Dorpat) spoke of the clinical and pathological aspects of the disease. The irritation, which is but slight during the formation of the follicles (trachoma siccum), is intense during the process of ulceration. He considers that the disease is due to a specific solid contagium, and that the secretion does not always contain it.

Prof. Schmidt-Rimpler (Göttingen) stated that trachoma is a disease distinct from follicular conjunctivitis both clinically, anatomically, and in its etiology. It is contagious, the virus not yet known. Michel's diplococcus is

not the cause. A predisposition to the disease is necessary in most cases, and it seems plausible to hold that climate also exerts an influence. The disease is a distinct entity, not to be confounded with syphilis, lupus or tuberculosis. The importance of the disease is such as to require State regulations in many countries.

Dr. Swan M. Burnett (Washington) spoke of racial influences in the etiology of trachoma, and called attention to the remarkable immunity from trachoma which the negro race enjoys.

The Geographical Distribution of Trachoma.—M. Chibret (Clermont-Ferraud) drew attention to the relative immunity from trachoma of the Celts, and stated that the transmission of the virus through one individual was sufficient to destroy its virulence for other Celts. He regarded follicular and vernal catarrh as attenuated forms of trachoma.

Dr. Sattler (Prague) also made a communication on the geographical distribution of trachoma.

In the discussion which followed, Drs. Libbrecht, Mayweg, Sulzer, Hirschberg, Logetchnikoff, Goldziehr, Wicherkiewicz, Heisrath, Cohn, Knapp, and Van Millingen took part.

The Pathology of Acute Contagious Conjunctivitis.—Dr. J. E. Weeks (New York) gave a detailed account of several epidemics which he had witnessed, and related the results of successful inoculations he had made upon the eyes of rabbits and children with micro-organisms cultivated from the conjunctival secretion. He believes that the pathogenic germ does not develop in a temperature below 30° C., and considers that, by the application of cold, the disease may be checked.

Dr. Grossmann (Liverpool) proposed some resolutions relative to the prevention of infantile ophthalmia.

Dr. Swan M. Burnett strongly supported the resolutions.

M. Javal (President), whilst fully approving of the resolutions themselves, said that the Section, according to the rules, had not power to do more than to express its opinion upon the subject.

August 5th, Afternoon.

President : Mr. JONATHAN HUTCHINSON (London).

M. Valude (Paris) presented a paper upon the pathology of neuropathic strabismus.

Dr. Gradle (Chicago) read a paper upon a method for the determination of latent squints, and exhibited an apparatus for measuring the angle of deviation, both for near and distant fixation, by estimating the distances of double images.

Dr. Berry (Edinburgh) demonstrated a stereoscopic phenomenon and Maddox's method of determining the point of equilibrium of the ocular muscles.

Discussion.—M. Javal expressed his opinion that muscular insufficiency is extremely rare, and doubted the utility of elaborate instruments for measuring the amount of a deviation so variable as that which exists in these cases. He regards muscular insufficiency as being mainly the effect of refractive errors, and has found it disappear on their correction.

M. Landolt (Paris) asserted that the want of co-ordination of the muscles is a powerful factor in asthenopia, and has found muscular insufficiency persisting in spite of the most perfect correction of all astigmatic errors.

Dr. Roosa disbelieved altogether in the existence of pure muscular asthenopia, and thought that ophthalmology had suffered from the introduction of this expression by Græfe.

Dr. Stevens (New York) spoke in opposition to this view.

Prof. Hirschberg spoke in strong support of the teachings of Græfe.

M. Chibret agreed with the views expressed by M. Javal, and considered that the correction of the refraction is sufficient to cure most cases of asthenopia.

Messrs. Gradle and Berry replied.

Contribution to the Theory of Squint, based on pathologico-anatomical Observations.—Dr. Schneller (Danzig) discussed the three factors which govern the production of squint : 1, the innervation of certain muscles ; 2, the state of the muscles themselves ; 3, the mechanical obstacles.

Discussion.—Prof. Schweigger called attention to the fact that the fixing eye sometimes is the one which possesses the weaker muscles, and therefore too rigorous conclusions must not be drawn from examining the muscles of the squinting eye alone.

Dr. Berry believed that any change found in the muscles was the consequence, and not the cause, of the squint.

The Numbering of Prisms in Ophthalmic Surgery.—Dr. Landolt spoke of the different methods of numbering prisms proposed by Drs. Jackson and Dennett and Mr. Prentice. He preferred to these the designation of the prisms by the angle of deviation of a ray passing through, so as to undergo the minimum amount of deflection.

Dr. Swan M. Burnett exhibited a prismometer, and described a metric system of numbering and measuring prisms.

Prof. Hirschberg considered that there was no necessity for a reform in the numbering of prisms.

August 6th, Afternoon.

President: Prof. Fuchs (Vienna).

Practical Testings for Colour-blindness.—Dr. Grossmann showed a new apparatus which enables the observer to detect central colour-scotomata of the smallest size. Stress was laid upon the necessity of establishing a standard for the perception of small coloured lights.

Dr. Augstein (Bromberg) referred to the tests which Dr. Grossmann had exhibited two years previously at Glasgow, which he regarded as superior to any others he had employed.

Prof. Raehlmann referred to his former investigation upon the limits of colour-perception for different wave lengths, and drew the curves which he had obtained for the normal and the colour-blind eyes.

Adaptation of the Diseased and of the Healthy Eye.—Dr. Schirmer (Göttingen) stated that the light-sense in the albino is the same as in the pigmented eye, and also that in the night-blind the lowest limit of sensation is equal to that of the normal eye, after prolonged adaptation in the

dark. Night-blindness seems, therefore, to be an anomaly of adaptation, and not of sensation. He believes adaptation to depend upon some process in the pigment epithelium, the nature of which is not yet understood.

Discussion.—Dr. Uhthoff (Berlin) expressed himself in opposition to these views, as he had found defective light-sense in cases of night-blindness, so that the affection could not be merely the result of defective adaptation.

Dr. Gruening (New York) also spoke.

Dr. Schirmer, in reply, laid stress upon the necessity of very prolonged adaptation (even 12 to 24 hours) before the light-sense could be properly tested in night-blindness.

M. Lyden Borthen (Trondjem) demonstrated a new refraction ophthalmoscope.

An Addition to the Ordinary Measurement of the Field of Vision, and on the Field in Glaucoma.—Dr. Bjerrum (Copenhagen) described his method, an account of which will be found at p. 104 of this volume.

Discussion.—Dr. Berry had found Bjerrum's method of great utility in diagnosing the early stages of glaucoma, and in distinguishing between toxic central amblyopia and central amblyopia in neuritis.

Prof. Hirschberg added his testimony to the value of this method, especially in early glaucoma.

The refraction in Mexico compared with that in Europe.—Dr. Ramos (Mexico) said in the three races in Mexico—the Europeans, half-breeds, and the natives—myopia is hardly met with, except in the Europeans. The half-breeds present a small percentage, while the natives are almost totally exempt Myopia is found to increase during school-life in Mexico, but not to the same extent as in Europe.

The Relation between the Far Point of Man and his Occupation.—M. Arminski (Esseil) read this paper. He holds that the hypermetropic eye is the normal eye of man and animals, and only becomes myopic under the strain of circumstances.

Daltonism in Connection with the Examination of Railway Officials and Seamen.—Dr. Libbrecht (Ghent) described his instrument for testing colour-blindness, which he employs in addition to the method of Holmgren. He advocates

international uniformity both in the colours and the code of signal lights.

August 7th, Morning.

President : Dr. H. Knapp (New York).

Sympathetic Ophthalmitis.—Mr. Brailey (London) opened this discussion. The exciting eye generally exhibits a plastic uveïtis, but the serous and suppurative form are also met with. Sympathetic inflammation is rare, except after perforating lesions ; but it has occurred after superficial burns, and even in non-perforating tumours. Histologically the plastic uveïtis consists of clusters of cells chiefly in the iris, ciliary body and external layers of the choroid ; the chorio-capillaris and the pigment epithelium remaining comparatively unaffected. Inflammation is found in the nerve-sheath. In the second eye papillitis is the first symptom in 10 p. c. of the cases, and in 5 p. c. the disease is restricted to the papilla and the vitreous. Keratitis punctata is always present, glaucoma is frequent. The episcleral tissue is much inflamed, and the other changes resemble those in the exciting eye, the chorio-capillaris and the retinal pigment being always free. The disease travels by the optic nerve-sheath, but we do not know yet its exact nature.

Preventive treatment by enucleation, evisceration, or section of the optic nerve is successful, if done in time. If glaucoma be present in the second eye, iridectomy produces a good result.

Sympathetic Ophthalmitis.—Dr. Deutschmann (Hamburg) : Sympathetic inflammation is quite distinct from sympathetic irritation, and is best described as ophthalmia migratoria. Experiments prove that the disease depends upon the presence of microbes, which travel along the lymph spaces of the optic nerve-sheath to the second eye. Experimental production of sympathetic ophthalmitis in the rabbit was always followed by meningitis and death. In man staphylococci were always present in both eyes, but it is possible that the immediate cause is a chemical poison akin to the ptomaines. The microbes have three ways to reach the optic nerve-sheath : first, suprachoroidal space ;

secondly, direct from the choroid into the pial sheath of the optic nerve; and, lastly, along the central blood-vessels.

Discussion.—M. Darien advocated M. Abadie's treatment by cauterization and injection of perchloride of mercury solution after perforating wounds, and also injection of the same drug into the sympathising eye.

Mr. Cross (Bristol) spoke of the prevention of the disease, and advocated enucleation as the only safe method. The introduction of an artificial vitreous is very dangerous, and has itself produced the disease.

Dr. Parisotti and Dr. Wicherkiewicz spoke.

Mr. Fulton (St. Paul) had found that sympathetic inflammation only resulted from suppurating wounds, and did not occur if injuries were treated aseptically.

Dr. Berry believed the disease to be due to microbes, but held that Deutschmann's experiments are not convincing. He had failed to find microbes in 14 eyes.

Prof. Cohn described a case of simulated sympathetic disease.

Mr. Story (Dublin) supported Dr. Deutschmann's views, but hoped he would succeed in producing sympathetic disease without general poisoning, so as to silence objectors.

Dr. Crainicéan (Bucharest) stated that only septic wounds produced sympathetic disease.

Prof. Haab had found in 12 cases of perforating wounds and panophthalmitis, bacilli which did not react well to staining fluids.

Dr. Rosenmeyer (Frankfurt) had seen atrophy of the papilla without papillitis, due, no doubt, to retrobulbar neuritis.

Dr. Levy (Strasburg) stated that his 42 experiments on rabbits had yielded only negative results.

Dr. Barkan (San Francisco), Dr. Logetchnikoff, Dr. Gruening and Mr. Hill Griffiths spoke.

Dr. Weeks (New York) opposed Dr. Deutschmann's views, as the experiments had merely produced pyæmia.

Dr. Pflueger (Berne) prefers evisceration in recent injuries, and reserves enucleation for old ones only.

Dr. Germann (St. Petersburg) referred to Dr. Schongolowitch's new method of staining the bacilli of trachoma as

a possible help in staining the micro-organisms of sympathetic disease.

Messrs. Deutschmann and Brailey replied.

Dr. Laqueur (Strasburg) read a paper on *Iridocyclitis after Influenza.*

Magnetic Foreign Bodies in the Eyeball.—M. Gallemaerts (Brussels) read this paper, and demonstrated the instrument of Léon Gérard for the diagnosis of magnetic foreign bodies in the interior of the eyeball.

Prof. Hirschberg criticised the instrument.

August 7th, Afternoon.

President: M. Wolfring (Warsaw).

The Endothelium of the Anterior Chamber.—M. Nicol (Liège): The results of the author's experiments of injecting corrosive sublimate into the anterior chamber were given. He exhibited microscopic slides, showing karyokinesis of the endothelium of the iris and cornea, and also the stomata in the endothelium of the anterior surface of the iris.

The Treatment of Sympathetic Ophthalmitis and of Trachoma.—Prof. Rosmini (Milan) advocated the treatment proposed by Gallenga of injecting corrosive sublimate, and the utility of strict antisepsis.

Acute Panophthalmitis.—M. Boé (Paris) has isolated a streptococcus to which he attributes contagious panophthalmitis. He prefers evisceration and antiseptic irrigation to enucleation.

Discussion.—Dr. Pflueger remarked that antiseptic injections alone were useless, but that he found evisceration the best and quickest mode of treatment.

Dr. Chibret supported the method of M. Abadie and M. Gallenga. He takes out the lens, and makes forcible injections of corrosive sublimate into the vitreous.

Glaucomatous Changes in the Vitreous.—M. Haensell (Paris), as the result of an extended series of observations, believes that the glaucomatous process consists in a hyaline degeneration, which invades all the ocular tissues progressively, and renders them incapable of performing their vital

functions. This degeneration may originate in the optic nerve, and then spread to the vitreous, in which case blindness, with cupping of the disc, ensues. The increase of tension is a secondary phenomenon.

New Treatment of Central Chorio-retinitis and Choroiditis Disseminata.—M. Darien recommended the treatment suggested by M. Abadie, which consists in hypodermic injections of corrosive sublimate every other day during several weeks, or even months.

Discussion.—M. Chibret had also obtained excellent results from this treatment. M. van Millingen corroborated the two previous speakers.

Bilateral Coloboma of the Choroid with normal Iris.—M. Talko exhibited drawings of the case, which was fully described.

Fatigue of the Visual Field and the Oscillating Field.—M. Wilbrand (Hamburg) showed perimetric charts of the field of vision in this peculiar class of cases.

M. Pflueger discussed the paper, and drew attention to the influence of "suggestion" in some of these cases, of which he gave a remarkable instance.

Autoplastic Operation after extirpation of Lid-tumours.—M. Wicherkiewicz: The method described was illustrated by drawings.

Infection and Disinfection of Eye Lotions.—M. Franke: The fact that all ordinary collyria soon develop micro-organisms led the author to experiment with various antiseptic agents, of which corrosive sublimate (1:5000) proved to be the most suitable.

August 8th, Morning.

President: M. Falchi (Pavia).

A Form of Choroiditis occurring in the subjects of Osteitis Deformans.—Mr. Jonathan Hutchinson (London) described a choroiditis met with in elderly patients, the subjects of this disease. It is a serpiginous form, involving the regions of the disc and macula, and not resulting from syphilis. Ophthalmoscopic drawings of this and other peculiar forms of choroiditis were exhibited.

The Effect of the Ultra-violet Rays.—M. Widmark reported that his experiments tend to show that the effects of the electric light on the eye are due to its action on the media, and not on the retina. The irritation is produced by the action of the ultra-violet rays only.

M. Javal exhibited a new biconical lens.

M. Sulzer (Winterthur) read a paper on *The Influence of the Angle α on Ophthalmo-metrical Measurements.*

M. Pflueger read a paper on *Ophthalmo-metrical Observations.*

M. Valude (Paris) described some new sphero-cylindrical periscopic lenses, which give much better results in astigmatism than the ordinary sphero-cylindrical glasses.

Alterations in the Retina in Experimentally-produced Rabies.—M. Falchi read this paper.

August 9th, Morning.

President: Prof. Snellen (Utrecht).

Dr. Bernheimer (Heidelberg) read a communication upon "An anomaly of the optic nerve, and the anatomy of the nerve roots in man."

M. Bunge (Halle) read a paper describing the chemical and physiological changes which follow the introduction of metallic iron into the eyeball. He pointed out the discoloration of the iris not infrequently observed in these cases, and exhibited microscopic section in illustration of his paper.

Cataract Extractions.—M. Bono (Turin) gave statistics of 1,250 cases operated upon by Sperino's method without iridectomy. Of the last 200, 1 per cent. only were totally unsuccessful, and 7 per cent. partially successful.

M. Wicherkiewicz mentioned the great satisfaction which washing out the anterior chamber after extraction had given him.

Dr. Uhthoff (Berlin) exhibited microscopical sections of various pathological changes in the optic nerve.

AMERICAN OPHTHALMOLOGICAL SOCIETY.

Twenty-sixth Annual Meeting,

Held at Kaaterskill, July, 1890.

President: Hasket Derby, M.D., of Boston.

Brain Tumours with Interesting Eye Symptoms.—Dr. Wm. F. Norris (Philadelphia) reported two cases. The first patient, a presumably healthy woman of 32, complained of inability to read continuously, and a sensation of dizziness if the attempt were persisted in. There were no headaches. The optic discs and fundi appeared normal, the extra-ocular muscles normally performed their functions. Examination of the field of vision showed for each eye a large defect in the upper left-hand quadrant of the field, which defect slowly increased until the fields were nearly hemianopic. Five months later there were occasional headaches, which became more severe. The optic discs became hazy and commenced to swell, the changes in them progressing so rapidly that in four or five days they presented a high degree of choked disc, with hemorrhages on the surface. Paresis of the right inferior rectus, then hemiplegia set in; and death occurred eight months after the first symptoms were noticed. The autopsy revealed a glioma of the right parietal lobe, extending back into the occipital lobe, and pressing upon and finally involving the right tract.

The other patient, also a woman, had first noticed roaring in the right ear, and intense neuralgia of the right trigeminus, with loss of taste on the right side of the tongue. When first seen, there was also loss of smell on the right side, the right eye was blind, the left read Jaeger 6, and the field was limited upward and inward. There was absolute deafness of the left ear, headache, and nausea. The ophthalmoscope showed the optic nerves whitish-grey in colour, very slightly prominent, a grey haze over the disc and extending into the surrounding retina, in short, rather the appearance of retrobulbar neuritis than those of neuro-retinitis or the atrophic changes consequent upon it. The ophthalmoscopic appearances remained substantially the

same. In six days the sight of the left eye was entirely lost, and subsequently all sense of smell and taste. In the later stages the right eye became prominent, and a slough formed at the lower margin of the cornea. The autopsy showed carcinoma of the region of the sella turcica, extending along the wings of the sphenoid bone, involving all the cranial nerves from the first to the eighth inclusive on the right side, and the first and second on the left.

Glio-sarcoma of the Optic Thalamus with Localizing Eye Symptoms.—Dr. C. A. Oliver (Philadelphia) had seen a man suffering from right hemiplegia, with right hemi-anæsthesia, and, when first seen by the writer, right lateral homonymous hemianopsia, the left field of vision being the smaller, with well-marked Wernicke hemiopic pupillary reaction sign. In the remaining fields there were fleeting scotomata for green, more pronounced on the left side, with slightly sub-normal colour perception, also more marked in the left field. In the right fundus there was a broad splotch-like hemorrhage extending over the lower outer quadrant of the disc, with enlargement and tortuosity of the retinal veins and the arteries of the same side. The grouping of the symptoms led to the diagnosis of a gross intra-cranial lesion in or near the left optic thalamus. Four weeks later the autopsy showed a glio-sarcoma involving the external portion of the left optic thalamus and the corpus striatum. The left optic tract as far forward as the optic chiasm was markedly flattened and pressed upon.

Transient Amblyopia and Bi-temporal Hemianopsia, with Malarial Cachexia.—Dr. Geo. C. Harlan (Philadelphia) reported the case of a sailor, aged 22, just arrived from a southern port. He was admitted to the Pennsylvania Hospital in a chill, with the history of several chills on ship-board. He was treated with quinine, in doses of 16 grains daily, and had no recurrence of the chill; but afterwards exhibited various nervous symptoms, such as outbreaks of mania, violent neuralgic pains, hallucinations of sight and hearing, perversions of the senses of taste and smell, head-aches, sensory paraplegia, and disturbances of co-ordination. These symptoms occurred with varying frequency and intensity for more than two months, when the patient

suddenly complained of dimness of sight and inability to see at all either to the right or left. Vision was found to be limited to small nasal fields, which were sharply defined and perfectly symmetrical. They remained without change for three days, when vision was lost entirely. The ophthalmoscope showed a perfectly normal fundus. Microscopical examination of the blood now showed pigmented corpuscles, such as are found in malarial cachexia, in large numbers; and the administration of large doses of quinine was followed by a rapid and permanent disappearance of all symptoms.

Extraction of Dislocated Lenses, Opaque or Transparent.—Dr. C. S. Bull (New York) had not found any special instrument necessary in these cases. He objected to the bident because it was an extra and unnecessary instrument, the use of which left four additional openings in the coats of the eye in close proximity to the dangerous ciliary region.

"*Simple*" *Extraction of Cataract.*—Dr. Bull's further experience with the "simple operation" had confirmed the conclusions he had already published (see p. 11 of this volume). The first 100 cases he had done by this method had been consecutive cases. But since then he had selected cases to the extent of performing an iridectomy when certain conditions were present.

Dr. H. D. Noyes was using the simple extraction in appropriate cases. While the *technique* of the operation is in some respects more difficult, it must be remembered that in getting rid of the iridectomy, the only part of the operation that is painful under cocaine, and the only part attended with bleeding, the operation is considerably simplified. In the matter of prolapse of the iris, the eye was very much at the mercy of the patient for a period of 24 hours or more. For the incising of a pupillary membrane, he had found advantage in reviving the old operation of introducing the needle through the sclera, and piercing the membrane from behind, on account of the increased length of the sweep that could thus be made.

Dr. R. A. Reeve (Toronto) said there were cases not suitable for simple extraction, and in which we must still do the old operation.

Dr. J. S. Prout (Brooklyn) had used isinglass plaster that caused no irritation, and kept the lids in perfect apposition to the globe. When the light but rigid wire shield was placed over this, a perfect dressing was attained. In a few cases he had resorted to the expedient of stitching together the lids.

Zonular Cataract.—The President reported eight cases of double zonular cataract occurring in one family, illustrating the greater liability of females. There was no history of convulsions in any case.

Dr. John Green (St. Louis) wished to record a series of such congenital cataracts, occurring in females all descendants of one great grandmother.

Exostosis of the Orbit.—Dr. T. R. Pooley (New York): An Irish girl, aged 23, came in August, 1888, for protrusion of the right eye, first noticed two years before. The displacement of the eye was down and out, and a hard tumour was felt in the upper inner angle of the orbit. An exploratory incision proved it an exostosis, but she refused operation. In February, 1890, she returned with greatly increased swelling, acute pain, redness and chemosis, and optic neuritis, and V. = $\frac{20}{200}$. Next day there was increase of pain, fever, and mild delirium. An incision was made along the upper and inner margin of the orbit, and the base of the growth easily separated by a chisel, without having to use any mallet. The most difficult part of the operation was the subsequent extraction of the tumour from the orbit, which was accomplished by turning it in its bed. A drainage tube was put in, but was rendered unnecessary by the free drainage that occurred through the nose. As sight returned, diplopia was noticed in the lower part of the field, apparently due solely to mechanical displacement. This gradually passed away. The exostosis was exhibited; its size was 39 × 30 × 28 mm., weight 26 grammes. It was of hard bony tissue, except the base.

Dr. R. A. Reeve exhibited a similar but somewhat larger growth removed by him some years ago, with complete relief of the patient and the preservation of the eye with good vision. The exostosis sprang from the roof of the orbit, and its removal exposed an area of dura mater. It

also was easily separated from its attachment, although there had been no symptoms of inflammation.

Cicatricial Ectropion Cured by Sliding Flap.—Dr. Pooley reported a case in which the lower lid was so badly damaged that it had seemed as if a Wolfe's operation would be necessary. The flap was taken from the adjoining temple.

Foreign Body in the Eye 19 *Years, Abscess in the Sclera, Recovery.*—Dr. B. L. Milliken (Cleveland) reported the case of a boy who in 1871, aged 10 years, was struck in the right eye with a bit of musket cap, not then supposed to have entered the eye. The eye was greatly inflamed, confining him to his room nearly three months, after which the eye remained quiet, except for attacks of inflammation in 1883, 1887, February, 1888, and September, 1889. When seen February, 1888, the eye showed, back of a linear opacity in the cornea, a slit in the iris, and an oblique track through the body of the lens, and in the anterior portion of the vitreous a greyish-white mass, apparently an encysted body. Vision in the right, $\frac{6}{36}$; left, $\frac{6}{6}$. Tenderness on pressure over the vitreous mass. In December, 1889, the projection of the sclera over the position of the vitreous mass was enlarging, and on January 14th it was opened under cocaine. Three or four drops of pus escaped, and with a spoon a number of hard black particles were scraped out. As much as possible of the interior of the sac was then removed with spoon, forceps, and scissors, the sclera and walls of the sac being at this place at least one centimetre thick. The eye recovered without a bad symptom, and the body previously seen in the vitreous chamber disappeared.

Cases of Foreign Body in the Orbit.—Dr. Wm. F. Norris reported two cases.

Complete Loss of the Lateral Movements of Both Eyes, Convergence Remaining Intact.—Dr. Milliken reported the case of a labourer, aged 33, who gave a history of occasional diplopia for the last twelve years. For the past few weeks he had been much annoyed by the double images. He had been addicted to the excessive use of alcohol, but denied syphilis. Vision = $\frac{6}{9}$ in each eye. When winking, the left eye did not close as rapidly as the right. The eyes followed an object carried up and down in front of them, but could

not be seen to move at all laterally. They were, however, able to fix an object and converge toward it when carried toward them, until it was within seven or eight inches. Pupillary reaction normal. There were no other nervous symptoms, and no history of previous illness. Ten grains of potassium iodide were ordered, but only a few doses were taken. In two weeks the lateral movement of the right eye seemed normal, and that of the left was improving. The patient then passed from under observation.

The Winking Test.—Dr. C. E. Rider (Rochester) under this head undertook to connect with the visual acuteness the ease with which one eye can be closed without closing the other. He proposed the terms *isopia* to indicate equality of visual acuteness between the two eyes of the same person; and *anisopia* to indicate inequality of visual acuteness from any cause whatever. In isopia most men could close either eye alone with equal facility; but only 56 per cent. of women had this power. But of cases of anisopia 94 per cent. of males and $84\frac{1}{2}$ per cent. of females could only wink with the poorer eye, or, if able to close the better eye while keeping the worse one open, it was only by a noticeably greater effort. The practical importance of the matter is, that in the power of separately winking each eye we have an indication of its relative visual acuteness. In advanced double cataract we might, by the winking test, choose the better eye to operate on. It will also be of service in medico-legal cases, and to demonstrate the existence of a defect from early life. In cases that seem the reverse of the rule, the history would often show that the eye which was now the worse had in early life been the better.

Dr. Randall recalled the difficulty he had in learning to wink his better eye, although the vision of the other was up to the usual standard of $\frac{20}{20}$.

New Tests for Binocular Vision.—Dr. J. A. Lippincott (Pittsburg) had utilised in this way the phenomena of binocular metamorphopsia that he had previously described (see *O. R.*, 1889, p. 262). A rectangular card is held before the patient at the ordinary reading distance. On holding a convex cylinder with its axis vertical, or a concave cylinder with its axis horizontal, before one eye, the side of

the card toward that eye appears longer than its fellow. But if the convex cylinder be held with its axis horizontal, or the concave with its axis vertical, that side appears shorter. Or, placing before the two eyes similar cylinders with their axes oblique, both upward and toward, or both upward and from, the median line, the top of the card will appear longer or shorter than the bottom, according as the cylinders are convex or concave, and their axes incline to or from the median line. These distortions only appear when there is binocular vision, and therefore furnish a ready test for its presence. They are most striking when cylinders of 1 to 2 D. are used.

Can Hyperopia be Healthfully Outgrown?—Dr. B. Alexander Randall (Philadelphia) claimed that many views held on authority are in conflict with the facts. One of these—that emmetropia is the prevalent state of refraction—is commonly ascribed to Donders, though he puts it at but $2\frac{1}{2}$ per cent. among the Dutch people. Hyeropia is almost universal in infancy, and emmetropia infrequent at all ages. Out of the assumption of the prevalence of emmetropia at maturity have grown numerous hypotheses as to hyeropia acquisita, and the decrease of hyeropia in childhood ; and there are authors who claim that hyeropia is merely a stage of immaturity, outgrown so completely with age that even 6 D. of myopia may be healthfully reached. This entire idea he wished to combat as being in conflict with clinical observation, and having no sufficient support of any sort. A few of the studies of children's eyes had shown hyeropia decreasing in degree from year to year, but they were offset by others more numerous and equally reliable, which either showed the contrary or were negative. Taking the consensus of all data obtainable, it appeared that there was a slight decrease in the amount of hyeropia up to the age of 20. But some corrections of these results seemed called for, by a critical study of the investigations from which they were derived, which would reduce still further the decrease in the grade, and in view of the known pathological tendency toward myopia in young eyes, it was evident that any physiological decrease of hyeropia was wholly unproved and highly improbable.

Dr. Norris, in examining the eyes of a series of new-born children, had found the hyeropia ranging from 0.75 to 2 D.

Treatment of Muscular Asthenopia and its Results.—Dr. H. D. Noyes (New York) reported the results in 100 consecutive cases in which prisms were tried for the relief of muscular asthenopia. Three-fourths of the patients followed some occupation requiring persistent eye-labour, 63 enjoyed good health, and 37 had health somewhat imperfect. The principal symptoms were ocular pain, blurring of vision, inability to follow moving objects, inability to keep the eyes fixed on one point, vertigo, and spasm of the accommodation. Sixty-three cases complained of headache on first awaking in the morning. In a very large proportion of the cases the refraction was emmetropic. Insufficiency of the interni occurred in seven cases, of the externi in 92 cases, and vertical insufficiencies in five cases, mostly in connection with one of the other forms. The writer was unable to declare what should be regarded as the normal or the abnormal relation of abduction to adduction. As the result of the treatment, 74 cases were quite relieved, seven experienced moderate and six slight improvement, and 13 got no relief. The prisms employed in the mass of cases had a total strength of not over three degrees. In 38 cases tenotomy would have been admissible, or advisable. It was resorted to in three cases.

Drs. McKay and Randall had themselves experienced great relief from the use of prisms.

Dr. Pooley called attention to the observation of Dr. Gruening, that headache on rising usually came from some nasal irritation, and should always lead to the search for and treatment of abnormal nasal conditions.

Drs. Harlan, Taylor, and Jackson spoke of the Maddox rod-test for heterophoria (see p. 129), which they had found very satisfactory.

Dr. Noyes had not observed the connection between nasal disease and morning headaches. Certainly it was connected with insufficiency of the externi, and prisms correcting that gave good results. The proportion given of insufficiencies of the externi was probably in excess of the usual

average; but he felt certain that these constituted 75 per cent. of all insufficiencies.

Purulent Ophthalmia and the Gonococcus.—Dr. J. A. Andrews (New York) had been particularly interested in the connection of this disease with the gonococcus. It was necessary to distinguish this species of bacteria from other similar forms by use of the Gram-Roux method. The results of his examinations were:—In 144 cases of chronic urethral gonorrhœa, the gonococcus was found in 108; in 17 cases of acute urethral gonorrhæa, in 72 cases of purulent ophthalmia in adults, and in 122 cases of purulent ophthalmia in the new-born it was found in every case. In nine cases of purulent ophthalmia in infants between two and three months old it was found in three cases. In the treatment of purulent ophthalmia he relies on rest in bed, the continuous application of cold by pledgets of linen kept on a block of ice and changed as often as they become warm, washing out the eye every few minutes with a saturated solution of boric acid, and the installation of a two per cent. solution of silver nitrate whenever the discharge becomes profuse. Care must be taken to avoid inoculation of healthy eyes, either of patients or others; and the cold pledgets must never be reapplied, but burnt.

Dr. Pooley thought silver nitrate the worst possible application in the early stage, before the blenorrhœa is fairly started, and he would use it not stronger than a one per cent. solution.

Dr. Rider thought harm had been done by the silver nitrate. He did not use it in adults, but still for children. The continuous application of cold, and cleanliness are the important measures.

Dr. Kollock believed that it was not the silver nitrate that did the harm, but neglect of perfect cleanliness.

Drs. Oliver and Abbott had seen epidemics of ophthalmia neonatorum in lying-in hospitals that were cut short by resort to the instillation of nitrate of silver.

Legislation for the Prevention of Blindness.—Dr. L. Howe (Buffalo) urged ophthalmologists to interest themselves in securing such legislation. Nearly one-fifth of all the blind in the asylums are there because of ophthalmia

neonatorum, while, if they had received the proper care from the very first, it is probable that only an exceedingly small proportion would have lost their vision. In other countries stringent regulations have been adopted as regards the course to be pursued by nurses and midwives when dealing with these cases. He deemed it desirable to obtain the passage of laws similar to that recently enacted in New York, requiring nurses to notify in writing a health officer or a regularly qualified practitioner of medicine, within six hours, of the appearance of any inflammation of the eyes in the new-born.

Cyst-like Bodies in the Conjunctiva.— Dr. Andrews reported a case of such bodies in the conjunctiva of a boy aged five, where they seemed to cause no inconvenience.

Xerosis.—Dr. Kollock read a paper on a new form of this disease, which we publish in full (see page 249).

Dr. Noyes thought the paper described an affection that does not occur in New York. Xerosis of the ordinary form occurs there, but is comparatively rare.

Dr. Karl Koller thought the affection was one that was not very rare in Austria.

Recurrent Irido-Choroiditis.—Dr. S. Theobald (Baltimore) reported the case of an unmarried lady, aged 25, free from syphilis, and living in a non-malarial region, whose left eye had become inflamed two years before, and was now blind, with cloudy media. The right was then normal, but five months later she returned with it almost blind, it having been inflamed three weeks. The left was enucleated. After this the right improved, vision reaching $\frac{15}{70}$. Then it grew suddenly worse, with œdema of the retina and exudation into the macular region. $V. = \frac{7}{200}$. Then it improved to $V. = \frac{15}{45}$. Thus temporary improvement alternated with repeated relapses, until in a few months vision was reduced to light perception. Then the tension rose to $+1$. Iridectomy restored the tension to normal, but all light perception was lost. The reporter regarded it as a case of sympathetic ophthalmia.

Glaucoma.—Dr. C. W. Kollock (Charleston) reported two cases with unusual features. The first patient, a single lady of 50, had typical chronic glaucoma of the left eye. On the second day after a large upward iridectomy, the

tension suddenly increased from normal to stony hardness, and vision became nil. A weak solution of eserine (gr. $\frac{1}{6}$ to f ℥$\frac{1}{1}$) was instilled every two hours without effect. The condition of high tension and total loss of vision continued two days. Then a four grain solution of eserine was resorted to, and one drop instilled every hour. The tension quickly became normal and remained so. Vision returned and improved until, in spite of high irregular astigmatism, remaining from the excessive pressure on the cornea, it was, with the correcting lens $=\frac{15}{70}$; corrected vision in the right eye $=\frac{15}{15}$. The second patient, a man aged 56, came February 19th, having suffered pain in the temples and head, and twitching of the right lids for six days. The right eye was normal, with corrected vision of $\frac{15}{15}$. The left had only perception of large objects, and showed choked disc, and hemorrhages and white patches in the retina. The urine contained $\frac{1}{5}$ albumen. March 29th, vision was zero, and the hemorrhages had been absorbed. April 8th, the tension was + T 1, and soon increased to stony hardness. On the 16th, posterior sclerotomy was done, but it gave no relief; and May 3rd the eyeball was enucleated. The urine continued albuminous.

Dr. Noyes thought it strange that glaucoma did not more frequently occur in connection with albuminuric and vascular disease involving the retina. He also had tried posterior sclerotomy in what seemed appropriate cases, and found it unsuccessful in giving relief.

Embolism of the Retinal Artery with Normal Vision.—Dr. W. F. Mittendorf (New York) reported a case in which only the upper branch of the artery was involved, and the region of the macula was supplied entirely by the descending branch. Vision remained $\frac{20}{20}$ at the macula, although the lower field was all gone.

Dr. O. F. Wadsworth (Boston) reported a case occurring in a woman aged 24, in which the field of vision was greatly contracted, but central vision was $\frac{14}{12}$. The ophthalmoscope showed the usual signs of thrombosis or embolism, except that the macula was quite free from œdema or other abnormal appearance. It was entirely supplied by an unusually large cilio-retinal artery.

Ocular Tumours.—Dr. Wm. H. Carmalt (New Haven) reported two cases of sarcoma of the conjunctiva, and two of glioma of the retina.

Orbital Cellulitis Secondary to Mastoid Abscess.—Dr. R. J. McKay (Wilmington, Del.) reported the case of a married woman aged 44, with a history of discharge from the right ear for three months, reduced in amount in the last few days. She was found with a very large mastoid abscess, and great swelling of the regions of the orbit and temple on the right side, protrusion of the right eye, which was quite blind, and with hazy media ; temperature $101\frac{1}{2}$, pulse 120, frequent chills and sweatings. The mastoid abscess was emptied of seven or eight ounces of pus, and the chemotic conjunctiva scarified. Two days later the protrusion of the eye, orbital swelling, and attending pain, had greatly increased. A deep incision was made at the upper inner angle of the orbit. From this bloody serum exuded ; and from this time there was steady improvement. The eye, however, atrophied, and the orbital contents became greatly shrunken. She has continued six years in good health.

Noteworthy Cases of Ametropia.—Dr. Theobald reported three cases of high hyperopia and hyperopic astigmatism, with much better near vision than would have been expected on account of their age.

Drs. Mathewson, Hubble, and Koller referred to such cases.

Dr. Jackson believed these cases are due either to a very small pupil acting as a stenopaic aperature ; or, where the pupil was larger, to differences in the state of refraction in different parts of the pupil.

Progressive Hyperopic Astigmatism.—Dr. Edward Jackson (Philadelphia) reported a series of 17 cases in which the astigmatism, measured with mydriatics, had increased 0·5 D. or more. He thought such cases constituted about 2 per cent. of all the refraction cases remaining under observation for an equal period, four and one-half years on the average. The cause seemed to be a tendency to unsymmetrical increase of the lens, or giving way of the sclero-corneal coat anteriorly, as it does posteriorly in progressive myopia, with the

symmetrical growth of the lens No case was observed in which the astigmatism diminished 0·5 D. or more.

Ocular Symptoms in the Third Stage of General Paralysis of the Insane.—Dr. A. Oliver (Philadelphia) found (1) the oculo-motor symptoms consist in varying though marked degrees of loss and enfeeblement of iris response to light-stimulus, accommodative effort, and converging power; lessening of ciliary muscle tone and action; weakening and inefficiency of extra-ocular muscles. These disturbances are greater than those seen during the second stage of the disease.

2. The sensory changes, though similar to those found in the second stage, are pronounced, and show a semi-atrophic condition of the optic nerve head, and a marked reduction in the amount of both the optic nerve and retinal circulations, with consequent lowering of centric and excentric vision for both form and colour.

3. The peculiar changes in the choroid and retina, indicative of more pronounced local disturbance and irritation of these tunics than those found in the second stage of the disease, all represent the results of greater wear and tear given to a more delicate and a more weakened organ.

4. Both the motor and sensory changes furnish evidences of a local disturbance of a more pronounced type than those shown in the early stage of the disorder, and rank among the many peripheral expressions of fast approaching degeneration and dissolution of nerve elements, most probably connected with cortex disintegration.

Problems in Refraction.—Dr. John Green (St. Louis) presented a general solution for the case of a small pencil of parallel rays falling on a plano-convex lens obliquely placed.

Symblepharon.—Dr. Harlan described a new operation for the relief of total symblepharon of the lower lid. (To be published in a subsequent issue.)

Cyst of the Iris.—Dr. Randall, on behalf of Dr. S. D. Risley and himself, presented drawings and a report of a case following a penetrating wound of the corneal margin, which had caused sympathetic neuro-retinitis. The left eye of a boy of 10 was penetrated by an air-gun dart, in Dec.

1882; hernia of the iris and traumatic cataract resulting. Excision of the prolapsed iris left a slight cystoid scar. A month later the right eye became weak, and neuro-retinitis was found, followed by slight serous iritis. Recovery was good, vision$=\frac{5}{6}$. Seven years later, the left eye became inflamed, and the right weak; and a cyst of the lower part of the iris was noted. Sarcoma was suspected, and enucleation advised, but consent was not obtained for two months, during which time the cyst grew markedly. Enucleation was followed by complete return to comfort.

Filaria Oculi Humani.—Dr. F. M. Wilson (Bridgeport, Conn.) exhibited three specimens, removed from just beneath the skin of a returned missionary, who had spent some years on the West Coast of Africa. The parasite is there very common, but seems to be confined to quite a small region. It is very frequently seen beneath the ocular conjunctiva, and removed without much harm. It migrates in the subcutaneous cellular tissues causing a visible movement and a tickling sensation as they approach the surface.

Pulsation of the Retinal Arteries, caused by Homatropin.—Dr. Harlan reported this occurrence in the eye of a man of sixty, in which the drug had been instilled to dilate the pupil.

Instruments, etc.—Dr. Harlan exhibited a modification of Noyes' ophthalmoscope, made of aluminium, and weighing but two ounces. Dr. McKay exhibited the prismometer of Mr. Charles F. Prentice.

On the motion of Dr. Randall, the Society endorsed the CENTRAD (see page 169) as a unit of strength for prisms, and directed that notice of such endorsement be sent to the Section of Ophthalmology of the Berlin Congress.

MUSCULAR ASTHENOPIA.

By D. B. St. John Roosa, M.D., LL.D. (New York.)

It is not always remembered that astigmatism was not known to be a very common anomaly, and that even hypermetropia had been just described as a frequent condition, when Graefe was in the midst of his investigations of asthenopia muscularis. Donders, in his classical essay upon "Hypermetropia as the Cause of Asthenopia," hardly concedes that insufficiency of the interni can really be classified as another cause. He speaks of it* as a "morbid state whose symptoms have some relation to those of asthenopia." Not fully appreciating the magnitude of his own discovery of the wide existence of astigmatism, he says "in astigmatism, too, we shall find phenomena resembling those of asthenopia." Now, everyone knows that asthenopia is the most frequent result of astigmatism. Before Donders' time, in 1841 and 1842, as every ophthalmologist will recall, Bonnet and Pétrequin supposed that they had found the primary cause of asthenopia in the muscles of the eye, but especially in the external muscles. Mackenzie shared their view, and endeavoured to prove that asthenopia was not entirely due to a fault in the accommodative muscle.

It is everywhere admitted that Donders removed a very large class of cases from the category of accommodative or muscular asthenopia by his discovery of hypermetropia. He conclusively showed that this large

* "Accommodation and Refraction," p. 265.

class depended solely upon an error of refraction. But Donders had no complete idea of the importance of astigmatism, both hypermetropic and myopic, but especially the former, as causes of asthenopia; while Graefe probably had still less. Hence the references of asthenopia to muscular weakness still went on, although to a less degree, on the lines laid down by Bonnet and Pétrequin, and extended by Graefe. Endorsed by these great names, muscular asthenopia continues to play a large part in the classification of ophthalmology. In America especially, a number of the profession, led by Stevens, ascribe not only asthenopia, but also grave constitutional affections—chorea, epilepsy, and even idiocy—to errors of refraction and accommodation, but of late years chiefly to muscular weaknesses. The treatment by tenotomy and prisms has gone on in the last decade to a greater extent than when Donders found the profession engaged in cutting muscles for the relief of all forms of asthenopia. This was not irrational if they were supposed to have a common origin in muscular weakness.

We are all familiar with the pains that Graefe took to demonstrate the tests for discovering and measuring insufficiencies, and with the fact that, as shown by Loring and others, they were after all inadequate. Still, they continue to be everywhere used, with improved instruments of various kinds.

Recently doubts have been thrown upon the accuracy of a system for increasing the power of variable and unstable muscles; but nowhere, except in Paris, by Javal and his limited following—among others, Dr. G. J. Bull—was astigmatism brought forward as making, with hypermetropia, the chief factor in the causation of asthenopia.

It is my belief that muscular asthenopia, as understood by Graefe, has no such importance as he and subsequent writers have attributed to it.

Insufficiency of ocular muscles is usually, if not

always, a consequence of organic conditions in the eye-ball; that is to say, of myopia, hypermetropia, and astigmatism. Working exactly on the lines of Donders' discoveries, muscular asthenopia should be expurgated from ophthalmic nomenclature.

If Donders had followed up his own great discovery, that hypermetropia was at the bottom of true asthenopia, by similar investigations in the field of astigmatism, he would have shown the profession that his own law, that an organic fixed condition of the eyeball is the chief cause of asthenopia, was of exclusive importance, and that unstable secondary muscular conditions did not deserve much consideration.

This is no hasty conclusion, based upon a few cases, but it is one formed after years of careful examination of several thousands of cases of the various forms of asthenopia.

This examination has been accompanied by a careful study of Graefe's and Donders' original writings, as well as the later ones of Javal, Mauthner, Alfred Graefe, Loring, Noyes, and others, who have both directly and indirectly contributed much of value to the elucidation of this important subject.

I have scrupulously endeavoured not to under-estimate the testimony of those who attach much importance to the treatment of asthenopia by prisms and tenotomies. I must confess, however, that a very brief study of their writings and an examination of a few of their cases were sufficient to convince me of the want of sound philosophy in the views of those who have announced that they have found in muscular insufficiencies and errors of refraction the *fons et origo mali*.

The chief reasons for my convictions are the following:—For some 15 years I have occasionally observed cases in which the correction of astigmatism, until then not corrected, entirely removed the necessity for prisms and the troublesome symptoms that were assumed to

depend upon muscular insufficiency. With more thorough examinations for astigmatism the number of these cases increased. In 1888 I saw something of Javal's methods and cases, and more especially those of his collaborateur, Dr. Bull, of Paris, formerly of the Manhattan Eye and Ear Hospital, together with the results of the ophthalmometer as remodelled by Javal. I became convinced that a great advance had been made in the recognition of astigmatism. I was soon myself able to find a much larger class of cases of asthenopia as depending upon astigmatism than ever before. After years of unsatisfactory work in this department of so-called muscular asthenopia, certainty appeared where formerly was doubt. The use of prisms had always been unsatisfactory in my practice, and I so expressed myself in a discussion in the American Ophthalmological Society years ago, although at one time I prescribed them freely, and I also continued to constantly test the muscles by their aid. Now I have replaced them by cylindric glasses.

I then undertook a series of examinations as to the condition of the ocular muscles in persons clearly not asthenopic nor suffering from nervous disease ; investigations on the same plan as those made by myself in 1877 and 1878* as to the existence of errors of refraction in persons not asthenopic. An examination of more than 100 such persons showed that equilibrium of the ocular muscles existed only in a moderate percentage of cases.† It was also found that the same muscles in the same individual had a different degree of strength at different times in a considerable proportion of cases. This was, of course, no new discovery. There cannot be a fixed standard by which we measure the

* Transactions of American Ophthalmological Society, 1878.

† I am writing away from my library, and I cannot give the figures exactly. They are contained in a paper published in the *Medical Record* and the *Medical Journal*, New York, April 19th, 1890.

power of the muscles of the eyeball any more than for other muscles of the body. It is strange that it has not been more widely appreciated that these exact tests, no matter how made, are after all delusive. But how different the condition of things when we come to the measurement of the refraction! Here we have conditions that are organic and fixed. By examining them we find Donders' principle correct, but his statements much too narrow. Ametropia, and not hypermetropia alone is at the bottom of asthenopia.

Donders and Graefe were thinking only of the insufficiency of the interni as causes of muscular asthenopia. While too many cases were classified by them under this head, especially by Graefe—for Donders' writings are not very clear on this subject—they had no conception apparently of the mighty part that weakness of the ocular muscles was to be made to play by some modern ophthalmologists. Insufficiencies of all the external muscles have been made to explain not only ocular weakness, but a whole class of affections of the nervous system. I believe that none of these insufficiencies of themselves lead to asthenopia, but that behind them, in the refractive error, are to be found the sources of asthenopia. These refractive errors cause insufficient muscular action, just as hypermetropia and astigmatism cause strabismus. Those who have been examining the muscles so carefully have been considering effects, not causes.

That there is a class of cases of asthenopia in neurotic subjects, and in women suffering from uterine disease, that is never perfectly relieved by correction of the errors of refraction is undoubtedly true. Neither can one relieve, except through the lapse of time, the asthenopia sometimes occurring after typhoid fever and other exhausting diseases. There is a *neurotic asthenopia*, and there probably is also an asthenopia, the precursor of central disease. Tenotomies and prisms are only means for treating these cases by suggestion, and their reported

cures should be placed under this head. Javal once wittily said, in regard to a case which was reported as having been *corrected* by a tenotomy, that any other *correction* of the patient would have done as well.

Most ophthalmologists have long observed that, on the whole, the use of prisms is unsatisfactory. It has always seemed to me a marvellous optical statement that weak prisms can have any effect in changing the relations of the muscles. I have abandoned their use for years. Javal says that he now never prescribes them, after having at one time used them constantly. As to tenotomies, nowhere in surgery has a more desolate field been left by operative procedure than that made by oculists and neurologists with mistaken zeal in the cutting of muscles of the eye.

The accusation was brought against me, after my remarks in the Ophthalmological Section in Berlin, by one of Graefe's successors in that city, that his great name was slandered in my rejection of his views of muscular asthenopia. No one needs to be told that such an accusation does not constitute an argument. I yield to no one in my high estimation of the renowned Graefe, whose pupil I have the honour to have been ; but to admit that he said the last word on any subject in ophthalmology is to confess that the whole science is at a standstill. Setting sentiment and preconceptions to one side, let us examine asthenopia in the light of Donders' work upon hypermetropia and that of Javal upon astigmatism, and we shall have no occasion to look to insufficiencies of the muscles as faults needing correction, except when they cause deformity or destroy binocular vision, when, if possible, they are to be remedied by operations or gymnastic exercises. The sources of asthenopia and of its results are to be found in ametropia.

PARIS, *September* 15*th*, 1890.

THE INVESTIGATION BY THE ROD-TEST OF PARESES AND PARALYSES OF THE OCULAR MUSCLES.

By Ernest E. Maddox, M.D., Edinburgh.

Further employment of the rod-test, described in the May number of the Review, has led me to believe that the best way to use it is in conjunction with the scale-test I had heretofore employed. For measuring lateral deviations, a horizontal scale is used, graduated from a central zero towards each end in degrees, or metre angles, for a standard distance of 5 m. or 6 m.*

The figures to the left of zero are in red, and those to the right in black. I had previously doubled this scale by placing a vertical prism, fixed in an ordinary spectacle frame, before one eye of the patient, so that an index pointer running up from the zero of the lowest scale pointed to that figure on the upper scale, expressive of any horizontal latent deviation thus made manifest. This answered fairly well, but it needed a good deal of explanation, and was, moreover, subject to the serious disadvantage that any lateral displacement of the head altered the result. I now use the same scale, with a candle flame, or small gas jet, placed just in front of its central zero.

On looking at this with the mounted rod held horizontally before one eye, a vertical stripe of light is seen crossing the scale at that figure which measures the deviation. For measuring *vertical* deviations (hyperphoria) another scale can be used, or the same one can be rotated round a central pivot into a vertical position.

In the absence of a scale, an ordinary tape measure, with its zero fixed to the wall just behind the flame, will suffice; the box in which the tape is coiled up

* Obtainable from Curry & Paxton, Opticians, London.

is then drawn out horizontally or vertically, as the case may be, till it meets the line. But the advantage of a fixed scale is due to the fact that the eyes in dissociation always waver a little, and often a good deal, and we can gather from the successive readings of the patient some idea of the extent of his variation. One property of the rod test seems to be of considerable value: it elicits diplopia in some cases where red glass and even prisms fail to do so, and enables us to test some cases which can be tested subjectively in no other way.

In testing for near vision, a scale, graduated suitably to the distance at which it is required to be used, is held with its zero just behind a tiny gas jet; or a vertical slit may be cut in a blackened piece of cardboard, with a scale at either side, and be held up to the window, though I cannot say this answers very well: a flame is better. In all cases it is well to wait a few moments before reading off the result, to allow the deviation to occur.

The application of the rod test in cases of paresis and paralysis of the ocular muscles is obvious. It enables us to *measure* the vertical and horizontal elements of a deviation in all positions of fixation, not only in those where spontaneous diplopia occurs, but the entire area of latent diplopia as well; so that, by placing the patient's head in different positions, pareses can be detected which remain unrevealed with the ordinary test of a candle and coloured glass, which, of course, is only available in an area of spontaneous diplopia. For instance, in a case of paralysis of the left inferior rectus, diagnosed by Dr. Mackay, after recovery had so far taken place that spontaneous diplopia ceased, the latent conditions could easily be made out with the rod test, and the correctness of the former diagnosis be demonstrated. Straight forward there was $\frac{3}{4}°$ of left hyperphoria, with a trace of crossed diplopia; to the left, 2° of left hyperphoria; down

and to the left, 4° ditto, with no horizontal deviation; down and to the right, nearly 4° of crossed diplopia, with no hyperphoria; above, orthophoria; and all latent. As an illustration, a chart is appended of a case of paralysis of right superior oblique.

PARALYSIS OF RIGHT SUPERIOR OBLIQUE.

0·5° R 0	1·5° R + 0·3°	4° R −1·2°
0·5° R + 1°	2° R + 1°	9° R + 1·5°
2·5° R + 3·5°	9° R + 7°	12° R + 11°

The light figures give the vertical deviation, R meaning that, in every position, there is right hyperphoria—*i.e.*, the right eye is highest. The case possessed some peculiarities. It is that of a man, aged 38, working in a pottery. In April, 1890, he noticed disturbance of vision for the first time. It began as a slight "quivering," which lasted a fortnight, then went away, but soon returned; then objects began to "separate at times into two." At first this seemed worse on looking up; "I could work fine on looking down, except down and to the left." Then the area of diplopia gradually settled below, and he could not see singly in any area below and to the left.

On August 28th he came to Dr. Berry's out-patient department in the Royal Infirmary. Some peculiarities in his case were that it made him dizzy to close the

right eye, contrary to expectation. On looking at objects to his left, the diplopia troubles him so that he is obliged to shut one eye, yet he elects to shut his *left*, the unaffected one. Moreover, he stabs correctly with his finger at an object with the left eye shut, but misses it by aiming considerably below when the right eye is shut. All this would, according to usual rules, point to the left as the affected eye; but of this Dr. Berry gave Græfe's explanation, that he had learned the new projection required for the right eye which was evidently his favourite, or, in other words, had selected the false image to be the true one, and turned the true one into a false. In accordance with this, the inclined image was more often that seen by the left eye than that seen by the right.

This leads me to say that the rod test can also be used to measure the inclination of the false and true images. It is done in either of two ways.

The disc which carries the rod can be rotated in a trial frame before one eye till the line of light from a flame appears vertical, or parallel with a vertical line on the wall, when the angle of the rod from the horizontal gives the angle of the image from the vertical; or else the rod can be maintained horizontal, with a spirit level, if necessary, or, better still, be rigidly fixed to a stand, while the rotating scale, already described, is turned about its pivot till it appears parallel with the line of light.

For abundance of clinical material on which to try these methods, I am much indebted to Dr. George Berry.

HADDEN (London). On Head-nodding and Head-jerking in Children. *Reprinted from the "Lancet," June* 14, 21, *and* 28, 1890.

In this paper, based upon 14 cases, Hadden gives a careful description of an affection by no means common, but occasional instances of which, in consequence of the eye symptoms, will probably come under the observation of most ophthalmologists. Notes of five of the cases are included in the paper, and an analysis of the total number, in reference to certain of the symptoms, is also given.

The author draws attention at the outset to the fact that these cases are not identical with those known as eclampsia nutans or the salaam convulsion. The general characters of the cases under discussion consist of "nodding or lateral movements of the head, either singly or associated with one another or with movements of rotation. Further, these movements may be almost constant, or may occur more especially during efforts at fixation or during excitement, always ceasing during sleep and when lying down. In most cases there is nystagmus of one or both eyes, vertical, horizontal, or rotatory, often occurring simultaneously with the onset of the head movements, but sometimes preceding or following them. The nystagmus is much more rapid than the head movements, and has an independent rhythm ; it is aggravated by attempts at fixation or by forcibly restraining the head, and may even be induced, when previously absent, by these means."

The patients are usually between six and twelve months of age, and in the majority of Hadden's cases the general health was good, but the "occurrence of any temporary debilitating condition had an aggravating effect on the movements."

The nystagmus is usually very rapid—four to six movements per second—and, although often continuous, is aggravated by attention, or by attempted fixation in certain directions. It is in the majority of cases binocular, though frequently unequal ; but in three of Hadden's cases it was

"strictly uniocular," and this feature has been described also by Henoch and Norrie. The movements of the eyes may or may not be the same in direction as those of the head; on this point the writer gives the results of analysis of his cases.

In two instances certain seizures were observed, in which there was momentary loss of consciousness, and in two others similar attacks were described by the patients' mothers. In none of these cases was there a family history of convulsions, but in two other cases a strong family history of convulsions was obtained. In one instance another child of the same family was reported by the mother to have had head-jerking and nystagmus. Evidence of congenital syphilis was forthcoming in two cases; the author does not think that syphilis "has any influence in the causation" of the affection. In three patients there was a history which warranted "the assumption that injury to the head is an occasional antecedent or aggravating agent."

The notes of the five cases published show that, as far as could be determined in such young patients, the acuteness of vision was unimpaired, and Mr. Gunn, who examined them, reported that the appearances of the optic discs and retinæ were normal.

In cause and duration the malady exhibits some variation; the movements may entirely cease in a few weeks; the nystagmus usually persists longer than the head movements, and may recur after an interval of several months. A few patients underwent mental changes, becoming passionate and sulky, or forgetful and less intelligent.

The treatment consisted generally in the administration of bromide of potassium and cod-liver oil, and such remedies as were indicated by intestinal or other symptoms. The author's conclusions upon the nature of this affection may be given in his own words. He says:—

"On this subject Henoch remarks: 'From an anatomical and physiological point of view, the frequent combination with nystagmus, less commonly with strabismus, is interesting. This combination has also been mentioned by other observers (Ebert and Demme), and seems to indicate that

the root-nuclei of the spinal accessory and of the upper spinal nerves supplying the affected muscles of the throat and neck stand in a very close relation to those of the ocular nerves (oculo-motorius).' Dr. Hughlings Jackson has recently suggested that these cases are a variety of spinal or spinal-system chorea—a symptomatic condition allied to canine chorea. Whilst agreeing with the views of these two well-known observers, I believe the real nature of this affection may be further elucidated by an appeal to the evolution of purposive movements in the infant. The first acquired voluntary movements in the young child are those of the head and eyeballs. Although so early as six weeks a child will follow an object with his eyes, the movements at this time are imperfect and irregular. It is not until about the fourth month that the movements of the head and eyes become harmoniously associated, and for a considerable period subsequently ataxic movements may be seen when the head is moved voluntarily. In other words here we have a purposive movement which, although acquired in some measure at an early period, is not fixed. In the disorder which I have been considering I believe there is a dissolution, or rather disarrangement, of movement. In nearly all my cases the children were notably good-tempered, and their intelligence was probably above the average. I put aside those instances in which some change in the mental state was observed after the lapse of a considerable period. In a few cases it was found that the child took notice early. These observations were made before the interpretation which I suggest had occurred to me. If it be true that evolution in some of these children is more than usually rapid, it is likely that the movements of the head and eyes are precocious, and hence there is additional liability to dissolution."

J. B. L.

A. Schapringer (New York). Traumatic Enophthalmus: Recovery. *New York Medicin. Monatschrift, June*, 1890.

The case recorded in this paper proves that enophthalmus—backward displacement of the eye in the orbit—may depend upon nerve lesion caused by contusion of the head.

A girl aged 7 fell, striking the right temple against an iron grating. Consciousness was not lost, but she was very giddy immediately afterwards; there was no bleeding from nose or ear. On her return home, two hours later, the mother at once noticed that the right upper eyelid drooped, and that the eye appeared sunken.

On examination six hours after the accident there was a bruise on the right temple. The right upper lid drooped so as to more than half cover the pupil; in other respects it appeared to be normal; it was not in the least swollen; the levator was not paralysed. The lower lid presented nothing abnormal. The right eye lay deeper in the orbit than the left, as shown by a depression in the lower lid; the difference was probably about 2 mm. The curvature of the cornea, as indicated by its reflex, showed no change. The pupil was round, active, and in all respects equal to that of the fellow eye. The tension of the right eye was distinctly diminished. The movements were normal, and, although in the mother's opinion the child appeared to squint, there was no deviation of any kind and no double vision. The acuteness of vision, so far as it could be tested, appeared to be normal and equal in the two eyes. The retinal vessels in the retracted eye were perhaps slightly enlarged; the ophthalmoscope showed no other change. The sensibility of the skin, the capillary circulation, and the temperature showed no discoverable difference on the two sides of the face or in the two ears. There was no tenderness of any special spot to suggest a fissure of any cranial bone. There was no pain or pressure on the orbital margin in the region of the trochlea; no giddiness remained; the pulse was normal. These observations were confirmed by several of the writer's colleagues.

The symptoms appeared to indicate a paralysing lesion

of the sympathetic. The ptosis and enophthalmus indicated loss of action of the orbital muscle of H. Mueller, the difference between this form of ptosis and that due to paralysis of the levator being that in the former the lid moves upwards in association with the eyeball, while in the latter it remains motionless. The loss of tension may be attributed to secretory disturbance within the eye. A small hemorrhage, involving the sympathetic root of the ciliary ganglion, would explain the whole thing. This root springs from the plexus cavernosus, which is firmly united with the bone beneath it ; it might easily be stretched or ruptured by such an accident as occurred in this case.

It is known that a complete paralysis of the upper part of the sympathetic system causes contraction of the pupil ; the fact that the dilator nerve-fibres for the pupil do not pass through the sympathetic root of the ciliary ganglion, and that the pupil in this case was not affected, favours the idea that the lesion lay in this root.

On the day following the accident the symptoms had partly subsided, and two days later had entirely disappeared.

The case differs from any hitherto recorded in that the sinking of the eye was noted immediately after the accident, and that rapid recovery took place.

Himly observed a case of traumatic enophthalmus, and attempted to explain the sinking of the eye by a supposed injury of the trochlea. At that time, however, Mueller's muscle was not known, and the diplopia which such an injury would necessarily produce was not understood.

Nieden and Gessner have described four cases in which injuries, accompanied by concussion of the head, were followed by permanent sinking backwards of the eye. Neither of these authors referred this displacement to a lesion of the sympathetic, probably because the pupil in every case remained normal. Nieden supposed it to be due to pressure-atrophy of the retrobulbar fat, Gessner to cicatricial shrinking.

The three following conditions are to be distinguished :—

Traumatic enophthalmus from lesion of the cervical

sympathetic.—This has been observed in exceptional cases of fractured collar-bone, in shot and punctured wounds of the neck, and after operations in the same region. Myosis is usually present ; it distinguishes these cases from those due to concussion of the skull.

Luxation and dislocation of the eyeball backwards.—These terms, rather than enophthalmus, should be used to describe the displacement which sometimes follows serious injuries of the orbit, or loss of tissue due to operations for the removal of tumours, etc.

Enophthalmus from spontaneous paralysis of the sympathetic.—This condition, sometimes known as Horner's disease, includes a series of changes in the eye and face, and may be allied with a periodic hemicrania.

The paper contains numerous references to the literature of the subject.

P. S.

AUGUSTE DUFOUR (Lausanne). Nuclear Paralysis of the Muscles of the Eye *Annales d'Oculistique, Mars-Avril*, 1890.

The author has collected 220 cases of ophthalmoplegia in which a nuclear lesion was diagnosed. These he has analysed and considered with regard to (1) the position of the lesion ; (2) the cause (*cause anatomique*) of the attack (as, for instance, hemorrhage) ; (3) the predisposing cause (*cause primaire*), such as syphilis or tuberculosis.

In ophthalmoplegia the position of the nerve lesion may be intra-cranial (*i.e.*, posterior to the sphenoidal fissure) or orbital (anterior to the sphenoidal fissure). Intra-cranial lesions, again, may be cerebral (*i.e.*, when in the brain substance) or basal (when attacking the nerve between its apparent origin and its entrance into the sphenoidal fissure). Cerebral lesions may be (1) cortical ; (2) cortico-fibrillary (*i.e.*, when in the fibres connecting the cortex with the deep origin of the nerve) ; (3) nuclear when in the deep origin); and (4) fascicular (when in the fibres connecting the deep and apparent origin).

The diagnosis of cortical and cortico-fibrillary lesions must be regarded as very uncertain ; fascicular lesions may be diagnosed when ophthalmoplegia is accompanied by crossed hemiplegia with or without involvement of the facial and hypoglossal; when the ophthalmoplegia is complete (*i.e.*, involving all the muscles of the eye) the lesion is probably in the inferior part of the peduncle, where the fibres of the third nerve are united into a single bundle.

Basal lesions may be diagnosed with probability when the olfactory nerves are also involved, or when there is unilateral paralysis of other cranial nerves with amaurosis of the implicated eye. Basal lesions may be excluded when the ophthalmoplegia is incomplete (*i.e.*, not involving all the muscles supplied by the third nerve).

Orbital nerve lesion may be diagnosed when the lesser oblique and the internal muscles of the eye alone are involved; but, except in this case, there is no symptom pathognomonic of this lesion. Ophthalmoplegia externa, whether unilateral or bilateral, caused by orbital cellulitis, may be distinguished from a nuclear paralysis by the conjunction of the following symptoms: immobility of one or both eyes ; immunity of the internal muscles ; absence of ptosis and pain on pressure ; amblyopia or amaurosis is a frequent complication.

The proper understanding of nuclear paralysis was greatly hindered by the belief that the nucleus of the third nerve was a single mass of motor cells. This misconception was corrected in 1878 by Hensen & Voelkers, who showed that this nerve has origin in a column of nerve cells, lying in the floor of the aqueduct of sylvius, from which a thin layer of grey matter separates it ; this column is made up of small masses of motor cells, corresponding to the various branches of the third nerve which supply the external muscles of the eye. In front of it, in the floor of the third ventricle, are placed the nuclei for the branches supplying the internal muscles of the eye.

The exact position of these subordinate nuclei has been the subject of much discussion, but Dufour finds that the position given them by Kahler & Pick fits in best with the

symptoms of his cases. This position may be represented by the following table :—

Median Line.		1. Ciliary muscle.	
		2. Sphincter iridis.	accommodation (*a*) light (*b*)
	6. Rectus internus.	3. Levator palpebræ.	
		4. Rectus superior.	
	7. Rectus inferior.	5. Obliquus inferior.	
		Obliquus superior.	

In this table the superior group, following Darkschewitsch, is placed at some distance from the middle line, and the two functions of the sphincter iridis are represented. The centre for the levator palpebræ is placed just below the superior group. Cases of ophthalmoplegia externa in which this muscle is not involved (and this is a noted feature of ophthalmoplegia externa) may be then explained by supposing a lesion which has involved the centres below, but has not reached 1, 2, or 3. It may be objected to this that the superior and inferior groups have a separate blood supply, and are divided by a considerable interval ; but, while admitting the force of this objection, Dufour is able to cite in favour of his view several clinical facts. These are : two cases in which the centres 1, 2, and 3 were not involved ; one in which 2 (*b*) and 3 alone escaped; one in which 1, 2, 6 and 3, only were involved ; two in which 1 and 2 (*a*) only were left untouched. It is also known that in complete ophthalmoplegia externa the superior group (1 and 2) is not attacked ; and in ophthalmoplegia interna that this group only is involved. He has also found two cases in which the lesion attacked successively the various centres in their order from above downwards, and one other case in which 1 alone was not attacked.

Hensen and Voelkers, from experiments on dogs, placed the centres in the following order from above downwards (the numbers refer to the preceding table) :—

Ciliary muscle (1)
Sphincter iridis (2)
Rectus internus (6)
,, superior (4)
Levator palpebræ (3)
Rectus inferior (7)
Obliquus inferior (5)

but Dufour has found 10 cases which cannot be explained by a single lesion if this be the order assumed, so that there is considerable clinical evidence in favour of placing them as in his table.

In 37 of the cases autopsies were made, with the following results :—

Nine cases : tumours of the nuclear region or its immediate neighbourhood were found. One case : softening after thrombosis.

Eight cases : hemorrhage in the nuclear region.

Seven cases : multiple hemorrhages in the nuclear region.

Three cases : inflammatory degeneration.

Six cases : atrophy of the nuclear cells.

Two cases : proliferation of the ependyma in the canal of Sylvius, with dilation of the vessels.

One case : nuclear lesions said to have been found, but their nature not specified.

In six other cases autopsies were also made, but with no results.

With regard to the cause of the attack (*cause anatomique*), the author found :—

Forty-two cases in which the lesion was a primary degeneration of the motor cells.

Twenty-eight cases in which the paralysis was a complication of a cerebro-spinal affection (21 of these accompanied locomotor ataxy).

Forty-six cases complicating a general affection (of these 21 were syphilitic).

Eighteen cases caused by troubles in the circulatory system.

Forty-three cases from poisoning (alcohol, nicotin, lead, etc.) (in these are included 11 cases in diphtheria and three in scarlatina).

Thirteen cases caused by direct violence to the head.

Nine cases from compression of tumours.

Twenty-one cases in which the cause was absolutely unknown.

Many of the cases are examined at some length and the reasons for their diagnosis as nuclear lesions gone into, and

the resemblance of those cases in which the lesion may be supposed to be a primary inflammation of the nuclear cells (*poliencephalite supérieure*) to bulbar paralysis is pointed out. In three of the cases the field of fixation is given, the object fixed being a word of two letters on the arc of the perimeter. It is interesting to observe that in 67 cases improvement was noted.

J. B. S.

FUCHS (Vienna).—Isolated Bilateral Ptosis. *Arch. f. Ophthal. XXXVI.* 1., *p.* 234.

Fuchs reports five cases in which bilateral ptosis was the only symptom of disease. The patients were all females, three of them aged 40, 60, and 56 years respectively. In these the ptosis had appeared late, and had slowly increased till it became almost complete, but usually unequal on the two sides. In the remaining two cases, aged 30 and 61, the ptosis was either congenital or developed in early infancy, but subsequently progressed to completeness. In both these cases, very markedly in the last, there was evidence of heredity of the affection. In the first three this history was wanting.

No history of syphilis was forthcoming in any of the cases, and there was no evidence of brain lesion. The upper eyelids were elongated and thinned to a remarkable degree, so that the anterior parts of the eyeball showed plainly through them. Any movement of the upper lids was effected by the occipito-frontalis muscle.

The author discusses the nature of these cases, and concludes that the ptosis is due to primary atrophy of the levator muscle. His conclusions are based upon the following facts :—

(1) The duration of the affection is very long ; and after many years there may still be a certain, though very limited, amount of contractile power retained by the muscle. (2) There is accompanying atrophy of the soft parts about the muscle. The thinning of the eyelid is very marked, and the shrinking of the orbital fat in the immediate vicinity of the levator is shown by the falling-in of the lid

just below the orbital rim. That this retraction is not due to cicatrisation is easily proved. (3) In some of the cases a slight degree of congenital ptosis exists, *i.e.*, an abnormal condition of the elevator muscle is present from birth, and perhaps predisposed to undergo change in later life.

Unfortunately, the assistance in the diagnosis of cases of muscular weakness, which can in most instances be obtained by examination of the electrical reactions, is in the case of the levator palpebræ unavailable. Fuchs removed and examined a small portion of the muscle in one of his cases, and found that the fibres had undergone extensive degeneration; the cross striation was in places indistinguishable, and the fibres much thinner than those from a healthy muscle; the nuclei were considerably increased in number, and there was marked pigmentary degeneration inside the sarcolemma; but no fatty degeneration was found. In some parts the fibres themselves appeared normal in structure; the connective tissue between them was increased in amount. The author is of opinion that his cases are best explained by a primary atrophy confined to the levator palpebræ muscles, and that it is a hitherto undescribed affection. He asks whether the atrophy is to be considered as neuropathic or myopathic, but is unable from his investigation of these cases to answer the question. J. B. L.

W. UHTHOFF (Berlin). Further Observations upon the Influence of the Intensity and Wave-length of Spectroscopic Light on Visual Acuity. *V. Graefe's Archiv., XXXVI. 1, p.* 33.

Uhthoff's former experiments were made with coloured cloth illuminated by lamplight. The present have been made with a spectroscope especially modified for the purpose, a lamp still forming the source of illumination. Opaque test types in monochromatically illuminated fields were used to test vision, these types being found superior to transparent monochromatically illuminated type in a dark field.

The experiment consisted of two series: (1) repetition of Uhthoff's former experiment, so as to determine the relation

of visual acuity to intensity of illumination in pure monochromatic spectral light; (2) experiments upon the relative visual acuity in different portions of the spectrum, the cleft that formed the source of light being constant. The alteration of the breadth of this cleft was used to alter the intensity of illumination in the first series. The results are fully given in numerical tables, and also expressed in geometrical curves.

In the first series the following wave-lengths were made use of :—670 $\mu\mu$ (red), 605 $\mu\mu$ (yellow), 575 $\mu\mu$ (yellow-green) 505 $\mu\mu$ (green), 470 $\mu\mu$ (blue), 430 $\mu\mu$ (violet). The curves show an extremely rapid increase of visual acuity by the slighter degrees of intensity of illumination, and a relatively slow increase by the higher degrees of intensity. After a certain degree of intensity the acuity increases no longer, and even actually decreases. Uhthoff has observed the latter effect when using light of 605 $\mu\mu$ wave-length. The acuity increased most rapidly, and also reached its highest point with light of 605 and 575 $\mu\mu$; *i.e.*, yellow and yellow-green light—the brightest portion of the spectrum. The curves differ somewhat toward the two extremities of the spectrum, and show that at the violet end acuity continues to increase with intensity of illumination for a longer period than at the red end. At the latter the highest acuity is attained sooner, and further increase of intensity does not raise it. This seems connected with Purkinje's observation that for blue a greater change of objective light intensity is required to perceive a difference in brightness than for red, and is in accordance with the enperiments of Macé de Lépinay and Nicati, von Helmholtz, Kœnig, and Brodhun.

In the second series of experiments coloured glasses were inserted between the lamp and the cleft which formed the source of light. Tables and curves are given showing Uhthoff's own visual acuity, with light of 14 different wave-lengths, and four different intensities of illumination; also the vision of two red-blind and two green-blind observers with one intensity of illumination only. The examination of these curves shows that they are not influenced to any extent by the objective light intensity, and that the curve of the red blind differs from that of the

green blind, which is almost exactly analogous to that of the normal eye. The observations are of interest in connection with the question of the relative luminosity of the different portions of the spectrum, and the means of ascertaining it. Two methods have been used: (1) similar to Uhthoff's own, determining the luminosity by comparing the visual acuity in different portions of the spectrum; (2) direct comparison with a white or coloured field of definite luminosity. Uhthoff's conclusion is that the results of the two methods are essentially in accord.

J. B. S.

PANAS (Paris). Clinical Observations on Abscess of the Frontal Sinuses.—*Archives d'Ophtalmol.*, *May–June*, 1890.

Panas states that the object of his paper is to draw attention to the close resemblance these cases bear to orbital disease, and the consequent difficulty in correctly diagnosing and properly treating them. He refers to four cases which had been under his care during the preceding year, which number he considers unusually large. Each of the four cases was at one time in its history incorrectly diagnosed by competent observers. Two were looked upon as cases of caries of the superior margin of the orbit; one as syphilitic or strumous periostitis in the same situation; one as a tenonitis. The author says that tubercular, syphilitic, or other forms of bone disease have their seat of election in the lower outer border of the orbit, and that suppuration about the superior orbital margin should always excite suspicion of disease of the frontal sinus. The very variable size of the frontal sinus in different individuals may, he thinks, explain the widely different points at which the pus may reach the skin surface.

In none of Panas' cases was there ozœna or other disease of the nasal fossæ. One constant symptom was severe pain in the area of distribution of the infra-orbital and nasal branches of the fifth nerve.

The treatment recommended by the author is simple, and, in his experience, effectual. An incision is made immediately below the inner end of the eyebrow, and through this incision the inferior, or orbital, wall of the sinus is trephined. A drainage tube inserted through this aperture may be allowed to drain externally, or its lower end may be carried into the nasal cavity. He prefers the former plan, which allows of better drainage and greater ease in the injection of antiseptic fluids into the abscess cavity. He used a 1·20,000 solution of biniodide of mercury; iodoform suspended in glycerine, and a strong solution of chloride of zinc.

The errors in diagnosis generally arise, in his opinion, from the retention in the orbit of the pus secreted by the mucous membrane of the frontal sinus, and which has escaped from that cavity, but is pent up in the orbit. Attention has recently been drawn to this occurrence in an article by Williams in the *Lancet*, March 1st, 1890.

J. B. L.

FUKALA (Pilsen-Karlsbad). **The Operative Treatment of High Myopia by Extraction of the Lens.** *Arch. f. Ophth. XXXVI.* 2., *p.* 230.

Fukala has in the past three years operated upon 23 myopic eyes, in all cases by repeated discission, this being done in some instances as often as 15 times, and the broken-up lens matter allowed to undergo absorption. The results, which are given in a brief report of the cases at the end of his paper, are certainly encouraging. The oldest patient was 24, the youngest 8. The myopia in all the cases was as high as 11 dioptres, and in some as high as 20 D. Only those eyes with good visual acuity (J.1) and free from choroidal or retinal disease were thus treated. In a small percentage of the cases an upward iridectomy was done before the lens was needled.

The author brings forward several cogent reasons for

recommending this treatment in suitable cases, and discusses some of the evident objections to it, such as the complete loss of the power of accommodation which follows removal of the lens.

A detailed account of the mode of procedure is given. This need hardly be repeated; suffice it to say that the writer advises that every precaution should be taken to avoid the production of increased tension, iritis or irido-choroiditis.

Fukala has found from his cases that in myopia of 15 to 16 D. the aphakic eye becomes emmetropic. The following brief record of five cases will give a general idea of the improvement in vision, which he seems to have obtained in nearly all the cases he has hitherto operated upon :—

(1) M., 8.—L. eye, My. 11 D. V. = $\frac{1}{11}$; two needlings, 12 months later + 6 D., V. = $\frac{2}{5}$.

(4) F., 15.—L. eye, My. 15 D., V. = $\frac{1}{10}$; discission nine times; eight months later + 1·25 D., V. = $\frac{1}{2}$.

(6) M., 15.—L. eye, My. 12 D., V. = $\frac{1}{10}$; discission 10 times, result + 4·5 D., V. = $\frac{2}{3}$.

(9) F., 22½.—R. eye, My. 20 D., V. = $\frac{1}{25}$; discission repeated 12 times; 12 months later — 5·5 D.. V. = $\frac{1}{2}$.

(17) M., 12.—L. eye, My. 12 D., V. = $\frac{1}{20}$; congenital coloboma of iris and choroid. Lens needled 13 times; subsequently + 4 D., V. = $\frac{1}{10}$.

J. B. L.

JUL. PFISTER (Zurich). The Shape and Size of the Intervaginal Space of the Optic Nerve in the Optic Canal. *V. Graefe's Archiv. XXXVI.* 1, *p.* 83.

Pfister has examined 10 optic nerves taken from the human subject in order to ascertain the precise anatomy of the intervaginal spaces in the optic canal. Two of the nerves were taken from a man aged 54, and two of them from a three-weeks-old child; the age of the other subjects uncertain. His conclusions are that the form of the nerve

and the size of the intervaginal space differ considerably in each individual, but there is always a considerable space between the dural and pial sheaths. This space occasionally runs completely round the nerve, but in other subjects is traversed by numerous bands of connective tissue. In some subjects these bands form broad adhesions, which are principally located at the lower and outer side towards the superior ophthalmic artery. The preparations show plainly that a free communication always exists between the subdural space of the brain and the intervaginal space of the optic nerve, although the latter does not always run completely round the nerve. In no case could a definite arachnoid sheath distinct from pial and dural sheath be made out.

J. B. S.

Evetzki (Moscow). Cataract and Conjunctival Xerosis in Glass Workers. *Westnik Ophth., May—June*, 1890; *and Arch. d'Ophtalmol., July—August*, 1890.

Evetzki in this paper publishes the results of an examination of the workmen employed in a glass factory near Moscow. In 1880 Meyerhöfer stated that he had come to the conclusion that workers in glass factories were more liable to suffer from cataract than were those engaged in different occupations. The author of this article, anxious to obtain facts for the corroboration or contravention of this opinion, undertook this investigation.

Seventy workmen were examined, and of these three showed signs of commencing cataract. They were between the ages of 43 and 56, an age at which cataract in its early stages is by no means uncommon in persons of any occupation.

Of the 70 workmen examined, Evetzki found patches of xerosis of the ocular conjunctiva in 31. These patches were found in young workmen, and they

resembled dry soap lather, and were generally to the outer side of the cornea. The men so affected were well nourished, and did not suffer from hemeralopia. The author looks upon the conjunctival affection as a purely local one, due to the intense heat to which the men are exposed.

J. B. L.

RECENT LITERATURE.

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Compt. rend. Soc. Biolog., Paris, 1890.

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Progrès méd. Nos. 31 *and* 32.

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Arch. d'Ophtal. X. 4., *p.* 340.

Fick and Guerber. Ueber Erholung der Netzhaut.
Graefe's Arch. XXXVI. 2., *p.* 245.

Moraviczk. Hysterisches Sehfeld in wachem und hypnotischem Zustande.
Pest. Med. chir., Presse 31.

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WIDMARK. Einige Beobachtungen über Augensymptome bei peripheren trigeminus affectionen.
Klin. Mon.-Bl., Sept., 1890, *p.* 343.

WOOD. Embolism of the superior nasal branch of the Arteria Centralis Retinæ.
Arch. of Ophth. XIX., Nos. 2 and 3.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

BASEVI. Fisiologia dei centri innervatori dell'iride.
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Inaug. Dissert., Strassburg, 1890.

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Arch. of Ophth. XIX., No. 2 and 3.

NUEL AND CORNIL. De l'endothélium de la chambre antérieure de l'œil ; particulièrement de celui de la cornée.
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BURCHARDT. Ueber die gonorrhoische Bindehautentzündung, besonders die Behandlung derselben.
Deut. Milit. Zeitschr. XIX. 8, *p.* 592.

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Graefe's Arch. XXXVI., 2, *p.* 163.

Grœnow. Nodular opacities of the Cornea.
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THE CAUSES, PREVENTION, AND TREATMENT OF MYOPIA.

*Discussion in the Ophthalmological Section of the British Medical Association Meeting at Birmingham, July, 1890.**

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The subject set down for our discussion is large; we cannot hope to deal fully with every part of it, but the chief points of practical importance will be raised, I think, if I ask you to consider the three following questions:

1. Is myopia a disease?

2. Can we prevent its occurrence or lessen its frequency?

3. On what general principles shall we deal with those who have it?

These are elementary questions, but they cover many points on which we are not yet entirely agreed, and which we may usefully discuss.

1. *Is Myopia a Disease?*—Donders, writing in 1864, said: † "The emmetropic eye is the normal eye. . . . A near-sighted eye is not a sound eye. . . . Progressive myopia is a true disease of the eye. . . . In youth almost every myopia is progressive." On the

* The papers by Messrs. Priestley Smith and Richardson Cross are here reprinted in order that readers of Dr. Berry's criticism, which follows, may have both sides of the question before them.—ED.

† Donders, Refraction and Accommodation of the Eye, New Sydenham Society, vol. xxii., pp. 341, 343, 392, and 213.

other hand, he admits that a slight degree of myopia may have its advantages for men engaged in study or minute work, and that in advanced life a moderate myopia does not threaten the eye with any special danger, and confers a privilege, namely that of reading easily without glasses, which may well be envied by emmetropic eyes. In the pages of later writers we find doctrines which differ considerably in one way or another from that of Donders. Landolt* is inclined to regard myopia, when it is not accompanied by damage of the tissues, as an adaptation of the organ "to the functions of a superior race"—as being "instituted in the interest of intellectual progress." He confesses, however, that Nature, in thus attempting to better the refraction, has not yet improved upon the workmanship of the emmetropic eye; that, on the contrary, she very frequently overshoots the mark, and not only makes the eye much nearer sighted than is desirable, but greatly damages its tissues in so doing; that myopic eyes bear the imprint of forced evolution, and are the type of hypertrophy rather than of perfection.

Berry † takes a somewhat similar view of the matter. He says that great confusion has arisen from a failure to discriminate between the myopia due to disease and the much commoner myopia which is the expression of a particular type, and is no more to be looked upon as pathological than is, for instance, the attainment of a greater than average stature. He says that we have wrongly assumed that the fate of a malignant myopia is the possible fate of every myopia, and that this false assumption has given rise to all sorts of theories to explain the progression of myopia during the period of growth, and to a corresponding number of more or less unpractical proposals as to how such progression is to be stopped.

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* Landolt, Refraction and Accommodation of the Eye, English Edition, pp. 420 and 421.

† Berry, Diseases of the Eye, 1889, p. 471.

Stilling * speaks even more positively to the same effect. He asserts that myopia of progressive type and disastrous issue is originally and essentially of different nature from the milder forms; it is not an aggravation of the latter. In high myopia, he says, the eye is diseased; it is not diseased because it is myopic; it is myopic because it is diseased.

Now, if these differences of opinion had no bearing on our manner of treating myopia we could afford to trouble ourselves little about them; but this is not the case. Our very aims in dealing with this widely spread condition of the eye must vary according as we read its nature in one way or another. If we really believe that Nature, when she transforms an emmetropic boy into a myopic youth is attempting to improve the race, we must, of course, welcome her efforts so long as she does not go too far or spoil the tissues of the eye. If we are convinced that high and disabling myopia is a fundamentally different thing from moderate and innocent myopia, and not an aggravation of it, we shall, of course, take no steps to prevent the one from developing into the other. But if, on the other hand, we regard every myopia from its very outset as an optical defect—a defect which from an innocent beginning may, for ought we can tell beforehand, pass on to a grave ending—we shall strive to prevent its occurrence if possible, and when it does occur to arrest its progress as soon and as completely as possible.

Let us briefly consider the facts. Up to the age of 45, at least, the emmetrope commands clear retinal pictures of objects at every distance greater than 12 inches from his eyes. He enjoys an extent of visual power which the most fortunate myope can only obtain by artificial means. Beyond 45 or 50, the emmetrope, while he still has an advantage over the myope in distant vision, is at a disadvantage in reading;

* Trans. of Ophth. Soc. at Heidelberg, 1886, p. 14, see Ophth. Rev. vol. vi. p. 7.

he must use glasses, while his slightly myopic rival still reads easily without. Either may now claim to be the better off; it is purely a question of taste; but we must remember that the myope has paid for his temporary privilege by a lifetime of short sight, while the emmetrope through nearly half a century has had no disability whatever. Even the ophthalmic operator, who knows how helpful a single dioptre of myopia may be to him at 50 years of age, will admit that the balance of advantage lies, on the whole, with the emmetrope.

Myopia, we are told, is the companion of intellectual progress, and truly it appears to be so, but it is a bad companion, not a friend. The details of the landscape, the shapes and movements of living creatures, architecture, pictures, the drama, the expression on the faces of our friends, surely it is well for the most intellectual man or woman to see these things without artificial aid. The emmetrope can see them all, and his books as well, until he is more than middle aged, and then a pair of reading glasses restores to him all that he loses.

In my judgment, then, myopia is a defect even when we regard the optical condition only. When we regard the tissue changes which frequently accompany it, the matter is still less open to question. What is the nature of the myopic process?

In infancy, hypermetropia appears to be the normal condition of the human eye. During childhood, the large majority of eyes become emmetropic, or nearly so; in other words, the refraction increases with the growth of the eye in very early life. This implies not a simple increase of size, but a change of proportion in certain dimensions; the length of the globe increases more than the focal length of the media. In many cases this increase is insufficient, and the eye remains permanently hypermetropic; in other cases it is excessive, and more or less myopia is permanently established. Hence the assertion that myopia in many cases is in no sense

pathological, but simply the expression of redundant growth. The doctrine is reasonable, and is supported by the fact that in many cases of slight and moderate myopia we find no morbid tissue changes, and that at the time when the growth of the body is completed, the myopia usually ceases to increase. But it is a dangerous doctrine, for it fails to cover certain other facts which cannot be safely disregarded.

In many cases of slight and moderate myopia, and in nearly all cases of high myopia, we find morbid tissue changes which imply something very different from redundant growth, namely, extension, thinning, and atrophy of the tunics in the neighbourhood of the optic nerve—changes which appear to show that the strain falling on these membranes in this situation is greater than they can adequately bear. The amount and increase of the atrophy is clearly connected with the amount and increase of the myopia. In the same eye it may be absent when the myopia is beginning, well marked when it is further advanced. Clearly, then, we have often to deal with some cause or causes beyond a mere excess of normal growth.

The position and nature of the atrophy, the conditions of life under which it is chiefly met with, its increase under certain circumstances, its non-increase under others—all appear to show that it is caused mainly by the action of the muscles during convergence of the eyes, at a time of life when the sclera in the neighbourhood of the optic nerve cannot adequately bear the strain, in other words, by overuse of the eyes on near objects in early life. According to Donders, strong convergence, the stooping position, and certain predisposing conditions, are the principal causes of staphyloma posticum, and staphyloma posticum is almost synonymous with myopia. All subsequent investigation has, in my opinion, tended to substantiate this dictum.

What are the causes which predispose certain children

to become myopic while others living under similar external conditions remain emmetropic or even hypermetropic? Various possible causes have been suggested; for example, peculiarities in the structure of the sclera, especially at the point where it joins the sheath of the optic nerve; peculiarities in the optic nerve, which cause it to offer a more than usual resistance to the rotation of the eye; peculiarities in the muscles affecting the directions in which they act upon the globe or their relations to the emerging vortex veins; peculiarities in the size, shape, and position of the orbits. The evidence as to these predisposing causes, is not yet, I think, very definite or conclusive. Of more practical importance is the distinctly hereditary nature of the predisposition; the children of myopes are not born myopic, but they are, as a rule, more apt to develop myopia than are the children of emmetropes. Curiously enough, some people seem to think that because a myopia is inherited it is therefore a natural and unobjectionable condition, which may be allowed to take its own course. The very opposite is true. Myopic parents ought to be doubly careful to protect their children from the active causes of myopia, and this for the sake not of the children only, but of the children's children.

I will not trouble you with figures to prove a close connection between school life and the development of myopia. Since Hermann Cohn led the way by his admirable research at Breslau nearly 25 years ago, statistics of the refraction of school children and college students have accumulated in overwhelming quantities. Their significance is disputed by some authorities, but to my mind, they give strong confirmation to the views of Donders, who, speaking of the injurious effects of continued strong convergence of the eyes and the stooping position of the head during reading and writing, declared that the foundation of myopia is mainly laid in the schools.*

*Accommodation and Refraction of the Eye, p. 343.

It is true that very high myopia is sometimes met with in persons who have never used their eyes much on near objects, for instance, in young children and illiterate persons belonging to the labouring class. These exceptions do not disprove the rule ; they show merely that the tunics may, under some conditions, become over-distended, apart from excessive action of the muscles and apart also from glaucomatous pressure in the eye. Whether this depends upon an original defect of structure or upon malnutrition of the tunics we do not know. Possibly the yielding and deformation of the sclera in some forms of myopia is analogous to the yielding and deformation of the bones in rickets.

A very important point in the myopic process is the tendency which it has to react upon itself. Excessive convergence increases the myopia, and the increase of the myopia compels a still greater convergence. The more the boy stoops over his book the more short-sighted he becomes, and the more short-sighted he becomes the more he is compelled to stoop. In this vicious circle the eyes not infrequently go on from bad to worse until, by reason of the altered shape of the globe and the extreme nearness of the farthest point of distinct vision, convergence for this point becomes impossible and the effort to obtain binocular vision in reading is instinctively given up. Then, with a relative or actual divergence of the eyes, the excessive muscular strain is at an end and there is a better chance that the myopic process will come to a standstill.

In many cases of high myopia and in some of moderate degree we have also serious congestive troubles in the uveal tract with more or less clouding of the vitreous—changes which are both a consequence and a further cause of extension and atrophy. Detachment and shrinking of the vitreous is not uncommon, and in the worst cases, happily a small proportion only, vision is permanently lost by detachment of the retina.

On the one hand, then, we see many myopes who

suffer little inconvenience from their ametropia at any time of life, on the other we see grave disability and even blindness arising from it; but great as this difference is we cannot safely, in my opinion, draw a hard and fast line between the two types and say here is a normal condition, here is a disease. In so far as the development of myopia in the individual and in the race is under our control, we should, I think, persistently endeavour to suppress it and to preserve the emmetropic type.

2. *Can we prevent the Occurrence of Myopia or Lessen its Frequency?*—If the foregoing explanations be true, we may answer the question as follows:—To prevent myopia we must prevent young people from using their eyes too long and too closely upon near objects. By doing so we shall limit the chief active cause; the predisposition we shall not immediately affect, but we may reasonably hope that if in each generation the fresh production of myopia is checked, the predisposition to it will in time diminish. This hope is justified when we see the opposite side of the picture. Educational pressure without due precaution has led, in Germany, to an enormous, and, as I think, calamitous development of myopia. The question is one chiefly of school hygiene. Elaborate rules concerning school buildings, school furniture, school books, and school hours have been formulated. I will not trouble you with them here. The present need is not a more accurate statement of these requirements, but a wider knowledge of them among the public. The printed sheet* which hangs upon the wall was prepared for the purpose of bringing and keeping the matter under the notice of teachers and scholars in the Birmingham Board schools. It now hangs in all these schools, and I am told by a member of the school board that, in some cases at any rate, it has effected a decided improvement in the attitude of the scholars. It is of the highest

* Eyesight and Schoolwork. Midland Educational Co., Birmingham.

importance that every school teacher should understand in a general way the mischief which may be done by overstrain of the eyes. When that knowledge becomes general the favourite scholars will not, so often as at present, carry off their school honours at the cost of damaged eyesight. In my opinion, a periodical testing of the bodily condition—including especially stature, weight, hearing, and eyesight—should accompany the usual examination in mental growth. The duty of the oculist in relation to this matter lies at present rather in promulgating common sense than in theorising as to ultimate causes. The knowledge we have is ample for the purpose, if we can get people to act upon it.

3. *On what General Principles shall we deal with those who have Myopia?*—The question sounds absurdly elementary, but I believe that we differ somewhat amongst ourselves in the treatment of our myopic patients, because we are not entirely agreed on general principles. I shall briefly state what appear to me to be the best lines of practice, and hope to excite criticism and discussion.

In every case of myopia the treatment should have a double aim :—

A. To remove as far as possible the present inconvenience.

B. To prevent as far as possible future deterioration of the eyes.

The details of the treatment will depend in each case upon the following circumstances :—

1. *The Age and Occupation of the Patient.*—Other things being equal, the earlier in life a myopia begins, the more likely is it to ultimately attain a high degree; and the more the patient is occupied, either through taste or necessity, in reading, writing, or other close work, the less likely is it to come to a standstill. Children born of myopic parents, developing myopia at an early age, and showing an exceptional fondness for books, are especially in need of restriction in study and

periodic examination of the eyes. Adults whose myopia is stationary commonly need advice rather as to present convenience than as to dangers ahead. Adults with high and still progressive myopia, who still read and write, or sew, without glasses, because, as they commonly say, they do not require them, need, of all others, the firmest interference and the gravest warnings, and must sacrifice some present convenience if they would avoid future disaster.

2. *The Degree and Character of the Myopia*, whether high or low, whether progressive or stationary, whether complicated or not with obvious congestive or atrophic changes. It is a safe rule to suspect every myopia of a tendency to increase, until time has proved it to be stationary ; to be doubly suspicious in presence of congestion or atrophy ; and to re-examine at intervals —three months, six months, twelve months, or longer, according to the nature of the case. In young people this is particularly important. It is important because a judicious regulation of the use of the eyes, more or less strict as the course of the case may demand, will check the advance of the myopia if it does not arrest it, and will check the development of the congestive and atrophic changes which too often accompany the advance. To this end we have to inquire as to the amount of book work habitually done, and the manner of doing it. We have often to urge a diminution, especially of evening work by artificial light ; and still more often to correct the manner of doing it by insisting on proper attitudes, and by giving glasses and other appliances which render such attitudes possible. In some cases we are bound to advise that all book work shall be given up, perhaps for several years. If we can stop the march of the myopia for a time, we shall gain much, for meanwhile the sclera will be growing stronger ; later on it may be better able to bear the strain. For such cases, schools or classes in which young people might be educated with a minimum use of books, pens, and paper are much wanted.

3. *The Range of the Accommodation*—The myopic eye, being focussed for a near point, uses its accommodation comparatively little. If we give the myope fully correcting glasses, and bid him read with them, we throw an unwonted task upon his ciliary muscles; at first they may be unable to meet the demand; after a little practice, in many cases they recover their normal vigour. Is the accommodative act injurious to the myopic eye? Does it tend to increase the myopia?

Some oculists have maintained that it is accommodation rather than convergence which does the mischief; others, while they regard convergence as the chief offender, yet hold that full play of the accommodation, as when correcting glasses are used for reading, is apt to do harm, and should not be allowed. My own custom, some years ago, was to act on this idea, and to give even to young myopes reading glasses weaker than those required for distance. Lately I have come to think differently, partly through reading a forcible article by Förster, an abstract of which may be found in the *Ophthalmic Review* for January, 1887. My present custom is to encourage rather than to discourage, within proper limits, the use of the accommodation; in other words, to advise those who can to use the same glasses for reading and for distance, and when this is impossible, by reason of weak accommodation, still to give reading glasses as strong as can be worn with comfort. The advantage of such glasses is that they not only enable but strongly encourage, and sometimes even compel, the myope to increase his reading distance. Experience shows, I think, that the more nearly we are able to re-establish a range and a region of accommodation similar to that possessed by the emmetrope, the better for the patient both in the present and in the future. We are often limited in this direction by impaired visual acuteness, and by the effect of concave glasses in diminishing the size of the retinal images. We must effect the best compromise which the circumstances will permit.

4. *The Presence or Absence of so-called Insufficiency of the Internal Recti.*—A proper balance between convergence and accommodation is to be obtained if possible. Correcting glasses may establish such a balance. On the other hand, they may greatly disturb a pre-existing balance. A progressive change of glasses, with gradual practice, may therefore be required. Binocular fixation may be favoured by decentration of the glasses, by the use of prisms, or by tenotomy. On the other hand, in high myopia, it is often better to encourage monocular fixation in reading, one eye being allowed to wander outwards, than to maintain a laborious and injurious convergence.

These are, I think, the chief considerations which should guide the treatment of myopia. I will not attempt to speak of details, or of the more serious choroidal and retinal complications which bring many of our myopic patients to us. We may sometimes palliate these, but we cannot cure them. We can do far more important service to the myope, if he will let us do it, by helping him to avoid these complications than by any remedial treatment after the fact.

It will perhaps serve to promote discussion if I conclude by making the following dogmatic assertions: Myopia is always a defect; often a disease. It is entirely incurable, but largely preventable. Its progress can be, and often is, accelerated by improper use of the eyes and retarded by judicious interference.

F. Richardson Cross, M.B., F.R.C.S.

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Numerous statements and statistics and the general experience of Ophthalmic Surgeons, indicate the increasing prevalence of short sight in this country.

It must be an extremely rare occurrence for a child to be born shortsighted, but he may be strongly predis-

posed by the conformation of the eyeball, by peculiarities in the tissues of which it is composed, or by its relations.

The main factor in causation is found during the act of convergence, which increases the surface pressure upon the eyeball of the muscles, which oppose this act, the external rectus and the two obliques.

The two muscles which mainly enwrap the globe, are the inferior oblique (17 mm.) and the external rectus (13 mm.) They thus exercise considerable pressure by their mere tone. Convergence increases their tension, and their surface contact, and exaggerates their compression of the eyeball. The superior oblique also produces an amount of compression, which varies with its insertion, and with the direction given it by the relative position of the trochlea.

With a given anatomical formation, or histological tendency in the eye tunics, a greater or less degree of myopia will be established by excessive convergence, whether in continuance or in degree. It is during the period of growth that shortsight first appears, and is most active in its progress—it is, out of all proportion, most commonly found amongst those who have used their eyes most assiduously for prolonged work requiring close vision.

More recent observations have only confirmed those of Cohn. (1) The higher the school, the greater the percentage of myopes. (2) In each school the number of myopes increases from class to class upwards. (3) The higher the school, or the higher the class in the same school, the higher is the average degree of the shortsight.

Even though in a perfectly healthy eye no amount of work *per se* causes myopia, at the same time many cases of shortsight are directly due to over-pressure and hygienic defects in the schools and colleges, and *it is of the first importance to develop an intelligent interest in this question in the minds of our schoolmasters, and to seek their active co-operation.*

Much has been written and said about over-education, but with competitive examination based upon its present principles, the cram system is likely to prove more and more popular. Long school hours are of no avail, unless also study is prolonged through the evening into the night.

In all this over-reading the chief primary strain falls upon the eye, and as a simple question of economy every possible means should be adopted to make its work easy.

1. The lighting of schoolrooms should be rendered perfect; and the best illumination during evening lessons, whether in the study or at home, is no less important.

2. School books should be thoroughly well printed, and no illegible paper for preparation should be given.

3. Properly arranged desks and forms should be provided to suit the stature (and not the class) of each student, and having thus made his proper attitude possible, his spine should be kept straight, and his eyes at a proper distance from their work, and spectacles must be used where necessary.

However perfect the conditions are made, under which eyework is to be done, there must be a limit to its safe amount, and this will vary with the individual. Faulty vision is present probably in at least half the scholars; hypermetropia mainly, to a less degree myopia; and in either case serious troubles may supervene upon injudicious use of the eyes.

The shortsighted eye is an accompaniment of high civilisation, and a *slight* myopia is perhaps rather an advantage in some forms of work; but beyond this the shortsighted eye is an invalid liable to congestion, to progress of the myopia, to degeneration of the choroid, or to detachment of the retina.

Many children have inherited a tendency to a distinctly pathological form of myopia, and to serious delicacy of the eye tunics. In these slight overwork readily induces hyperemia and inflammation of the

choroid with excessive yielding at the posterior pole of the eyeball.

Both parents and teachers should recognise in these cases the necessity for making a modification in the ordinary school curriculum, and the importance of competent supervision.

If hygienic defects in schools are really responsible for the causation or increase in degree of myopia, a great responsibility rests upon those whose duty it is to see these defects remedied.

ON MYOPIA.

A CRITICISM OF THE DISCUSSION AT BIRMINGHAM.

By George A. Berry,

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It is, I think, a pity that the position taken up by Mr. Priestley Smith, in his able address on myopia at the last British Medical Association Meeting, should not at the time have met with any opposition. The subject had long previously been announced as one for discussion. Every speaker, however, agreed more or less completely with the alarmist views, which originated some years ago in Germany, as a result to a great extent of Donders' teaching that the myopic eye is a diseased eye.

I firmly believe that the prevailing opinion with respect to myopia, which, to judge from the report given in the *British Medical Journal* of September 27th, was also held at the meeting in question, is in many respects erroneous. I have elsewhere stated my reasons for this, and Mr. Priestley Smith has referred to my views in

his address. As I was not at the Birmingham meeting, and have just read the report, I take this opportunity of offering some criticism on the statements there made by Mr. Priestley Smith and others. I shall, at the same time, attempt to define my position with respect to the treatment and prophylaxis of myopia.

One remark, in the first place, with reference to the term "alarmist," which I have applied to the views endorsed by the section at their meeting. These views are not only prevalent—they might indeed fairly be called hackneyed, having regard to the extensive literature which has sprung up in support of them. But it is not because they recognise the increase of myopia that I use the term. That the proportion of myopia over other conditions of refraction has increased, and is increasing with civilisation, is unfortunately an undoubted fact. On the other hand, I maintain that it has not been demonstrated that the increase has been accompanied by a corresponding increase, or indeed by any proportional increase at all, in the very high degrees of myopia which are readily recognisable as diseased conditions. It is because the views supported by the Ophthalmological Section at Birmingham nevertheless assume such to be the case that they must be called alarmist.

Mr. Priestley Smith remarks—"It is true that very high myopia is sometimes met with in persons who have never used their eyes much on near objects, for instance, in young children and in illiterate persons belonging to the labouring class. These exceptions do not disprove the rule; they show merely that the tunics may, under some conditions, become over-distended, apart from excessive action of the muscles and apart also from glaucomatous pressure in the eye."

Now I would ask him in which class of patients does he find the largest proportion of deleterious, excessive, myopia, and in which the largest proportion of moderate or slight myopia with fair or good vision? If his

experience is like mine—and I should be greatly astonished if there were much difference in this respect between Edinburgh and Birmingham—he must acknowledge that the bad cases are greatly more frequent amongst his hospital patients and the others amongst his private patients. If the ordinary cases of myopia had any tendency to pass into the severer type, surely this difference would not be such a common experience.

But I am far from asserting that a hard and fast line always separates the benign, typical, myopia from that which is characterised by choroidal disease. Although they are essentially different conditions, etiologically as well as anatomically, they may co-exist. Now the question comes to be, is it proved, or has it even been shown to be probable, that the co-existence is due to the one condition passing into the other, owing to the existence of circumstances, such as the too constant use of the eyes for reading, which are calculated to increase the myopia? For my part neither my own experience nor the numerous statistics which have been published have convinced me that such is the case.

Another remark of Mr. Priestley Smith's which calls for notice is the following :—

"Curiously enough, some people seem to think that because a myopia is inherited, it is therefore a natural and unobjectionable condition, which may be allowed to take its own course."

Quite true! Both good and bad anatomical and other peculiarities are inherited, and because myopia is inherited, it does not follow that it is a harmless condition. But let us look at the question in another light. It is just with regard to this fact of inheritance that such a great difference exists in the two kinds of myopia. Whereas it is a factor of the greatest importance in that form which, while it tends to increase with the growth of the individual and probably also more quickly under certain conditions than under others, yet shows an overwhelming tendency to assume a permanent form at, or

shortly after, the period of attainment of full growth. It is conspicuously absent in the bad progressive myopia from disease. This is surely sufficient evidence that while heredity is a factor of causal importance and, as I believe, of immensely preponderating importance, it does not in the case of myopia come to be a question of the inheritance of a disease. The tendency to the inheritance of the defect is bad enough, but the future is not so gloomy, if we recognise that it is not the inherited condition which is to be most dreaded. Those who believe as I do, then whilst they may endorse the sentence in Mr. Priestley Smith's address, which immediately follows the one just quoted, will not do so with quite the same object in view. That sentence is—"Myopic parents ought to be doubly careful to protect their children from the active causes of myopia, and this for the sake not of the children only, but of the children's children."

It must, I think, be admitted that close application of the eyes exerts some influence on the progression of ordinary typical myopia.

What the extent of that influence is, is far from evident. Still less can we point with any certainty to its nature. None of the many statistics which show an increase in the proportion of the myopes from year to year in the same school give anything like sufficient data for estimating how much of the increase is directly due to the school work. The factor of heredity and the tendency to increase with growth are not sufficiently allowed for. One of the most uncritical and most unscientific statistical researches in this connection is just, to my mind, that of Hermann Cohn, on which Mr. Priestley Smith lays so much stress. The same may be said of most of the German statistics, as the racial tendency to myopia is so marked in that country. For instance, in America amongst children subjected to exactly the same conditions of school life myopia has been found to be more frequent in Germans. Besides

German research of this nature so often represents so much plodding work on some entirely theoretical basis that it fails to be of any value at all. The only circumstance which could lead one to feel sure that some factor of etiological importance existed in connection with schooling or reading during adolescence is that we may recognise a decidedly slower progression and a tendency to arrive earlier at the stationary condition in cases where the correcting glasses are constantly worn, than in others where this has not been the practice. It is pretty well brought out too in Tscherning's work,* one of the few statistical works on myopia of any real value

But what is the nature of the influence of reading during the period of growth, and why is it that much more continued reading and other close application of the eyes in after life should not have the same tendency? The only answer to this that I know of is that it is altogether unknown. For some reason or other the eyes of young people, and mainly of those hereditarily disposed, become, through persistent use for near vision, shorter in their focus. Both Mr. Priestley Smith and Mr. Cross speak quite confidently on the subject ; they do not appear to doubt in the least that it is the continued convergence of the optic axes, necessary for near vision, which causes the myopia. Thus Mr. Cross says :—†

"The main general factor in causation is found during the act of convergence, which increases the surface pressure upon the eyeball of the muscles which oppose this act. The external rectus lies in contact with the globe for an average length of no less than thirteen millimètres, and, by its mere tone, exercises considerable side pressure upon the eye. The greater the convergence the more the external rectus enwraps the globe, increases the side pressure, and tends to elongate the antero-posterior diameter of the eye."

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* Græfe's Archiv. Vol. 1883, Pt. I.

† Brit. Med. Journ., Sept. 27th, 1890, p. 725.

This is spoken of therefore as if it were an undoubted fact. And yet so far as I know, no positive evidence has ever been brought forward in favour of it. It is merely one of the many hypotheses to account for the antero-posterior elongation of the eye. Indeed there are many clinical facts which I should consider strong arguments against the influence of convergence. For instance, in the condition in which convergence is most persistently and most constantly active, viz., convergent strabismus, it is the exception to find myopia. Where there is myopia, too, it has preceded the convergence and is not always found to increase after convergence has become persistent. Again, in cases of unilateral myopia there is often no convergent power at all, and yet the myopia in the one eye may go on increasing.

Apart from theory, however, I would not have it understood that, because I recognise no other known factor than heredity in the production of myopia, I see no need for school reform, or for treatment of any kind. From a hygienic point of view there can be no question that good light, and ventilation and comfortable desks are desirable. If they have any influence at all on the myopia it can only be for good. All I should say is that in advocating such changes we need not lay claim to knowledge which we do not possess. Of more importance, I believe, is the proper selection of glasses, as experience has shown this to have some real counteracting influence, whatever be the explanation.

But to really bring about a diminution to any extent in the number of myopes would, as it appears to me, be possible only in two ways which, under present conditions, are not practical. In the first place, by preventing the inter-marriage of myopic individuals and, in the second, by reverting to a less civilised state in which the struggle for existence would be rendered less easy for the myope.

In conclusion I may say that with Mr. Priestley Smith

I hold that "in so far as the development of myopia in the individual and in the race is under our control we should, I think, persistently endeavour to suppress it and to preserve the emmetropic type."

OTTO SCHEFFELS (Wiesbaden). On Resection of the Optic Nerve. *Klin. Monatsbl. f. Augenheilkunde. June*, 1890, *p.* 197.

Forty-one cases of resection of the optic nerve by Dr. Pagenstecher are reported in this paper by the resident surgeon of the eye hospital at Wiesbaden. Pagenstecher was led to the adoption of this operation not by theoretical considerations, but by the wish to find a substitute for the disfiguring operation of enucleation. The latter is objectionable; firstly, because of the troubles which attend the wearing of even the best made artificial eye, especially among the poorer class of patients: the cost, the speedy spoiling of the polished surface, the irritation of the conjunctiva, and, in some cases, the subsequent shrinking of the latter and inability to tolerate the artificial eye; secondly, because the moral effect of the operation is considerable. The man who possesses two eyes, even though one be little better than a stump, has not only a better chance in the labour market than the man who has but one, but is without the painful consciousness of mutilation under which the other suffers.

The simpler operation of neurotomy, which was practised for a time by the late Alexander Pagenstecher, was abandoned later because it did not appear to guard sufficiently against reunion of the divided nerve ends, and was replaced by resection.

The first cases treated by resection were those in which the lost eye was itself painful or interfered with the easy use of its healthy fellow. The success which followed led to its employment in a more important class of cases, namely, those in which there was reason to fear that the

lost eye might lead to sympathetic inflammation in its fellow. Its employment instead of enucleation in these latter cases, especially where a foreign body was lodged in the injured eye, was not adopted without a feeling of heavy responsibility.

The 41 cases treated, with satisfactory result in every instance, are classified as follows :—

A. Fifteen cases in which the blinded eye was the direct cause of suffering, (recurrent inflammation with pain, or photopsia) viz. :—

Secondary Glaucoma, absolute, five cases; (adherent leucoma with staphyloma, three; irido-choroiditis with closure of the pupil, two).

Hæmorrhagic glaucoma, one case.

Detachment of retina with photopsia and cyclitis, one case.

Irido-choroiditis with cyclitis, one case.

Shrunken globe with pain, and in one instance with bone formation, seven cases.

In seven of these 15 cases there was sympathetic irritation of the sound eye, and this disappeared after the operation.

B. 26 cases in which sympathetic inflammation of the other eye was to be feared, viz. :—

Shrunken globe after perforation by injury or inflammation with recurrent irritation; four cases.

Recent injuries, viz. :—

Rupture of sclera, five cases.

Injury of cornea, iris, etc., not involving ciliary body, five cases.

Injury involving ciliary body, four cases.

Foreign body in eye, viz., percussion cap, iron, stone, marble, shot.

Dynamite exploder, eight cases.

The operation is performed by Dr. Pagenstecher as follows :—The conjunctiva is divided over the insertion of the internal rectus, and the tendon is raised on an ordinary strabismus hook. A strong silk thread armed with a needle at each end, is passed through the muscle; the tendon is divided close to the globe; an assistant holding the suture

draws the tendon lightly towards the nose. Tenon's capsule is then separated upwards, downwards, and backwards, as far as possible, which often means the free division of inflammatory adhesions. A sharp double hook is then passed backwards, exactly in the horizontal line, and by its means the globe is drawn outwards and forwards, while with closed curved scissors the operator feels for the optic nerve, which is now on the stretch. When this is found the scissors are opened and passed further backwards, and the nerve is divided as far back as possible. At this point a moderate hæmorrhage occurs. By means of the hook the back of the eye is now dragged forwards, while with the help of the closed scissors the divided nerve is levered out of Tenon's capsule. Directly he can see it, the assistant seizes the cut end of the nerve with forceps, and drags it forwards, so as to bring the posterior pole of the globe well to the front. The nerve is then divided close to the sclera and with a few snips of the scissors the back of the eye, so far as it is accessible, is cleanly shaved. The tendons of the two oblique muscles are not divided. The eye is then replaced and rotated inwards and backwards by the finger-tips of the assistant. The tendon of the internal rectus is now sutured by means of the two needles near to the corneal margin, and one or two sutures are used to close the conjunctival wound, if necessary.

The operation is performed with ether narcosis; chloroform has not been used in the Wiesbaden Hospital during the last 15 years. In two cases in which the optic nerves had long been atrophied, it was performed painlessly with the help of cocaine only.

The bleeding from the central artery usually causes a moderate exophthalmus, which however is controlled by the sutures through the muscle and çonjuctiva. The prominence of the globe is generally gone at the end of four to six days, even though it have been considerable. In one single case a very free hæmorrhage dislocated the globe outside the eyelids, and a partial necrosis of the sclera followed. In such a case, the globe, if it seems unlikely to recover its normal position later, should be at once removed.

In two instances the double hook used in rotating the eye perforated thin staphylomatous parts of the sclera, and gave exit to much of the fluid vitreous, but the tension of the globe quickly returned, and was maintained, the only disadvantage being that the temporary collapse of the globe increased the difficulty of finding the optic nerve.

In presence of suppurative choroiditis the operation exercised a highly beneficial influence not only on the subjective symptoms, but on the acuteness of the inflammation.

In two cases a corneal staphyloma, previously progressive, disappeared, and the former high tension sank to the normal. In all other instances of increased tension this persisted after the operation.

Total anæsthesia of the cornea was always present immediately after the operation, but was not permanent. The margin of the cornea, after a few weeks, and the remainder after a longer period, generally recovered sensibility of subnormal degree.

The pupil, in the absence of synechia generally acquired a maximum dilatation ; in one case only it showed a prompt consensual reaction to light 21 months after the operation.

The operation may sometimes be completed in three to four minutes. The longest piece of nerve removed measured 15·5 mm. Often it is not possible to remove so much, especially in presence of inflammatory adhesions around the globe.

A simple optico-ciliary neurotomy is not a sure preventive of sympathetic inflammation. In proof of this the author refers to the case recorded by Leber, and reports another from Pagenstecher's practice.

Does resection of the nerve offer greater safety from sympathetic inflammation than simple neurotomy ? The non-appearance of sympathetic mischief in the 26 cases here reported, in which, but for the operation, this disaster seemed likely to occur, gives, of course, no conclusive evidence, for we have no certainty that it would have occurred had the operation been omitted. On the other hand, the occasional appearance of sympathetic disease after resection, should it occur, must not be taken as positive

evidence on the other side, for we know that such mischief sometimes appears after enucleation, although at the time of the operation the fellow eye appears to be perfectly sound.

From the results obtained at Wiesbaden, the author draws the following practical conclusions :—

In all cases in which the blind eye is the sole cause of suffering, or in which sympathetic irritation of the fellow eye exists, but sympathetic inflammation is not to be feared, resection of the nerve is preferable to enucleation.

In cases in which sympathetic inflammation is to be feared, it is now desirable that resection should be freely tried as a substitute for enucleation, in order that its efficacy may be definitely determined. Should sympathetic ophthalmia occur in a single instance after a correct resection —that is the removal of a sufficient portion of the nerve performed at an early period—as has twice happened after a simple neurotomy, then for this class of cases the operation must be abandoned.

P. S.

DEUTSCHMANN (Hamburg) Arthritis Blenorrhoica. *Arch. f. Ophthal. XXXVI. 1. p.* 109.

The author records two cases as follows :—(1) A child æt. three weeks brought to him with severe blenorrhœa neo-natorum, for which no treatment had been adopted. The conjunctival affection was typical, and under the use of nitrate of silver behaved in the usual way. Twelve days later a right-sided otitis media developed, attributed by the mother to pus entering the external ear from the conjunctiva. Simultaneously, or very soon afterwards, severe swelling of the right wrist and left ankle joint appeared. Deutschmann proposed to puncture the affected joint in order to examine the secretion, but the child did not come to him again, and died soon after with cerebral symptoms, probably due to extension of disease from the ear.

(2.) A three-weeks-old child, with blenorrhœa neonatorum, which had received no treatment. A few days

before the child was brought to the hospital, redness and swelling of the left knee-joint had come on. In other respects the child was healthy. Microscopic examination of the conjunctival secretion revealed numerous gonococci, mostly in the cells. The patient was the ninth child, and the eight previous children had all suffered from blenorrhœa neo-natorum. A small quantity of secretion from the urethra of the mother was examined, but no gonococci discovered, and no evidence of gonococci could be found in the urine of the father.

The knee-joint of the child was punctured with a Pravaz' syringe, and a small quantity of purulent fluid removed ; this was found on examination to contain large numbers of gonococci, corresponding closely in all particulars to the description of the microbe given by Neisser. The similarity, in clinical aspects, between these cases of joint affection, following blenorrhœa neo-natorum, and that which occurs in the course of gonorrhœa is manifest, and strongly indicative of the pathogenetic identity of the two inflammations.

The previous records of arthritic inflammation in cases of purulent ophthalmia are not very numerous, and may be here briefly noticed ; for the references to them, we must refer readers to Deutschmann's paper. Poncet and Galezowski in 1875 recorded cases of gonorrhœal rheumatism, in patients inoculated with urethral pus for the cure of severe pannus ; this was before the discovery of the gonococcus. Debierre, ten years later, published a case of conjunctival blenorrhœa, in which fourteen days after infection, inflammation of the left elbow joint appeared ; this patient was a child, who had been accidentally inoculated from a new born child. Lucas and Fendick, in the same year, each reported cases of swelling of joints during ophthalmia neo-natorum. Zatvorincki also, in 1885, recorded inflammation of elbow and wrist joints in a newly-born child with purulent ophthalmia ; the mother of the child, three days after her confinement, was attacked by severe para-metritis, and the affection in both patients was considered of microbic origin. Lastly, Widmark published a case of purulent conjunctivitis in a child (? newly-born) ;

the secretion from the conjunctiva contained gonococci ; sixteen days after the commencement of the ophthalmia the right ankle joint became acutely inflamed.

In none of the foregoing cases is there mention o examination of the exudation in the inflamed joints. In all in which any statement upon the point is made, the third week is given as the time at which the joint affection appeared. This corresponds closely with Deutschmann's cases. In both his patients it is perhaps noteworthy that the conjunctival affection had existed for some time without treatment ; he also notes that the secretion was profuse and was uninfluenced by the onset of the arthritis. In his second case complete recovery ensued.

The author has on several occasions removed portions of the conjunctiva in cases of blenorrhœa neo-natorum, as he did in the two reported cases ; microscopic examination of the piece excised showed the gonococci in and between the epithelial cells, and in the sub-epithelial tissue, enclosed in the pus cells, and adjoining the loops of delicate vessels in this tissue. It seems probable that here the microbes find their way into the blood and lymph channels and are carried thence to distant parts of the body.

J. B. L.

Panas (Paris). **The Anæsthetic Properties of Strophanthin and of Ouabain.** *Archives d'Ophtalmol., Mars—Avril*, 1890.

In a short paper communicated to the Academy of Medicine, Panas has recounted his experience with strophanthin and ouabain used to the conjunctiva as local anæsthetics. After ascertaining the effect of the two drugs (in 1·1000 solution) on the conjunctiva of rabbits, and having noted the absence of any irritation from their use, he applied both solutions to the eyes of patients of various ages.

Ouabain failed to produce any anæsthesia whatever, and its application was unaccompanied by pain or congestion.

Strophanthin excited severe burning pain, with lacrimation and intense congestion. These symptoms lasted not less than two hours.

The healthy cornea, in one patient, became anæsthetic fifteen minutes after the drug was applied, and the loss of sensation lasted for two hours. In another patient suffering from an irido-keratitis, the cornea never became completely anæsthetic ; in this failure to produce entire loss of sensation in an inflamed eye, the drug resembles cocain. From the experiments he has made, Panas concludes:

(1) That ouabain acts as an anæsthetic on the eyes of rabbits, but has no effect upon the human eyes.

(2) That strophanthin, although superior to ouabain in its effect upon the eye, is not in any way comparable to cocain as a local anæsthetic, and is much more irritating to the conjunctiva.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, OCTOBER 16TH, 1890.

HENRY POWER, F.R.C.S., President, in the Chair.

Introductory Address.—On taking his seat as President of the Society, Mr. Power paid a graceful tribute to his predecessor in the chair, Dr. Hughlings Jackson. He referred to the address delivered by Mr. Hulke on a similar occasion, three years previously, which included a sketch of the wonderful developments and improvements in ophthalmology within that eminent surgeon's immediate knowledge and observation. Looking back through the past year, there was no startling discovery in ophthalmology to be recorded. There was, however, ample room for investigation. Much still remained unknown in the pathology and treatment of such diseases as sympathetic ophthalmia, white atrophy of the disc, and conical cornea. Glaucoma, acute and chronic, was still not fully understood, and the best method of operating in cataract, and of treating secondary cataracts and detachment of the retina were not yet agreed upon. Mr. Power made a brief allusion to the more important papers and books on ophthalmology published

during the past year both in this country and abroad. He congratulated the Society upon the award of the Middlemore prize to two of its members. After referring to the large and increasing membership of the Society, he urged upon those who were intending to take up this branch of medical science the importance of a thorough preliminary training, both general and medical.

Graefe's Lid Sign.—Dr. Sharkey read a paper based upon the results of the examination of 613 patients at St. Thomas's Hospital, suffering from various diseases. He said: The questions I set myself to answer were: 1. What views do others hold as to the value of the lid sign? As a matter of fact, is it always present in Graves' disease? 2. Is it always absent in health and in other diseases? In reply to the first question, reference to the literature of the subject showed that Graefe himself in 1864, describing the sign as the absence of correspondence between the movement of the lid and the elevation and lowering of the visual plane, considered it pathognomonic, and consequently particularly important in the earliest stages of the affection when other symptoms left some doubt as to the diagnosis. Subsequent writers have recognised the importance of the symptom, but do not consider it pathognomonic. My own experience is that it is often absent in Graves' disease. But is it always absent in health and in other diseases? No one seems ever to have deliberately set about answering this question. And yet on an answer to it mainly depends the importance of the symptom. Among the 613 cases of diseases of all kinds examined, 12, or a little less than 2 per cent., presented it well marked. Many others had it so long as they stared at the object held before them, and it was difficult to prevent them from doing so. A large proportion of healthy people can voluntarily produce the lid sign in themselves by staring. Inasmuch, then, as Graefe's lid sign is far from always present in undoubted cases of Graves' disease, and is often very well marked in others who certainly have not Graves' disease, it cannot be considered very valuable as a diagnostic sign. What is the cause of Graefe's lid sign? It is clear that there is overaction of the muscles which raise the lid, namely, the levator palpebræ, supplied by the third nerve,

and the unstriped muscle of the lid supplied by the sympathetic. Remak showed that irritation of the sympathetic produced elevation and retraction of the upper lid ; and the fact that one can voluntarily produce this shows that it can likewise be effected through the third cranial nerve. Constant active spasm rarely results from irritation, though intermittent spasm may. Prolonged spasm most frequently owes its origin to paralysis or weakening of opposing muscles. Is there evidence in Graves' disease of a weakening of the muscles which close the eyes? Stellwag has shown that a very constant symptom of the disease is diminished frequency and incompleteness of involuntary closure of the lids, which goes on so continuously in health. The orbicularis palpebrarum, which effects this movement, and is the opponent of the muscles which raise the lid, being weakened in Graves' disease, and losing tone by inaction, the healthy equilibrium of the muscles of the eye is lost, the opening overpowering the closing muscles, and producing retraction of the upper lid and Graefe's sign. Thus the infrequency of winking, which Stellwag refers to disease of the centre, is the primary result of disease, and retraction of the lids and Graefe's sign follow as a consequence. This appears to me to be the most satisfactory explanation of the lid sign.

Recovery from Graves' Disease.—Mr. Lawford read notes of the case of a female, aged 43, who ten years previously had been seriously ill with all the usual symptoms of exophthalmic goitre, and had been under treatment at a London hospital for some months. She slowly recovered, and had been for the last nine years in good health, but liable to bronchitis. She attended as an out-patient at St. Thomas's Hospital for conjunctivitis, and it was then noticed that there was marked proptosis, but no other signs of disease ; the eyelids were normal in position and movement ; the thyroid could not be felt, and there was no cardiac trouble. The patient herself stated that the protrusion of the eyes had not diminished since they became prominent during her acute illness ; but with this exception she knew of no symptom left by the attack.

Dr. Hughlings Jackson referred to a series of cases collected by Mr. Roxburgh, but not published, in which

exophthalmos occurred without the other symptoms of Graves' disease. It was important to know that the disorder might pass off, as in the case reported.

Mr. Poulett Wells referred to a case of Graves' disease in a woman whom he had seen at Moorfields. She had all the usual symptoms and signs well marked, and rapidly improved after treatment by iron and bromide of potash.

Dr. James Anderson had met with cases that recovered, but in them there remained considerable pigmentation of the skin. He thought that Graves' disease, like glycosuria, included a number of different conditions. At the present time several groups of symptoms were recognised, cardiac, goîtrous, ocular, and changes of disposition, which were not often all present in the same subject. Graefe's symptom was often encountered, but was not sufficiently constant to be pathognomonic.

Dr. Sidney Coupland thought that if the retraction of the upper lid were due to spasm of the levator palpebræ, induced by the lack of opposing force in the orbicularis palpebrarum, it was unlikely that the symptom would occur during the act of staring.

Mr. McHardy spoke of the extreme rarity of necropsies upon cases of Graves' disease. He also called attention to the occurrence of alopecia areata in these patients. He had met with it in three, in two of which it was associated with considerable pigmentation of the skin.

Dr. Sharkey briefly replied to the remarks made upon his paper, and further explained his reasons for the views he had enunciated. In the act of staring there was preponderance of action of the levator palpebræ, although the orbicularis palpebrarum might be normal. In Graves' disease the preponderance of the levator muscle was due, not necessarily to its overaction, but to diminished power in the opposing orbicularis muscle.

Paralysis of both External Recti, with Contraction of the Internal Recti.—This communication by Mr. Donaldson (Londonderry) was read by the Secretary. Jane K., aged 70. When about 50 years old the eyes began to turn in, and the deviation slowly increased for about ten years. The eyelids are generally almost closed, as shown in a

photograph, but can be partially raised by the action of the occipito-frontalis. Both eyeballs are rotated inwards and a little downwards, so that the outer margin of each cornea is barely visible at the inner canthus. The deviation is rather greater in the right eye. The movement of the eyes is extremely limited. Perception of light is retained, and the patient complains that a bright light is painful to her. Her general health is good ; there is no other paralysis, and no sign or history of rheumatism, gout, syphilis, alcoholism, or injury is obtainable.

Card Specimens :—

Mr. Marcus Gunn : Cases of Traumatic Mydriasis.

Mr. Treacher Collins : Bloodstaining of Cornea ; Case and Microscopical Sections.

Mr. T. Phillips : Bilateral Coloboma of Iris, Lens, and Choroid.

Mr. J. T. James : Vaccine Vesicle of the Eyelid.

Mr. Silcock : Gumma of Subconjunctival Tissue.

ON MYOPIA—A REPLY TO DR. BERRY'S CRITICISM.

By Priestley Smith.

Dr. Berry's criticism of our recent discussion on myopia (O. R., Nov., 1890) is most welcome, for the position which he takes in this matter found no advocate among the speakers, and the questions on which I had hoped to excite debate were handled from the one side only. To the criticism now before us I desire to make a brief reply.

Dr. Berry, while he regrets the increasing prevalence of myopia, holds that the ordinary doctrines concerning it are too alarmist. His argument being that benign typical myopia is etiologically and anatomically an essentially different condition from the myopia which is characterised by choroidal disease; that the transformation of the one into the other, by overuse of the eyes, has not been proved or even shown to be probable, and that so far as we know, it is the benign myopia only, not the myopia with choroidal disease, which is becoming more frequent.

To show that the benign has not any tendency to pass into the deleterious type, he maintains that while myopia as a whole is much commoner among private than among hospital patients, the bad cases are greatly more frequent among the latter class—and he asks me whether this is not my experience also. I have endeavoured to test the point by examining the records

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of 2,000 consecutive private cases, and the same number of consecutive hospital cases.

Among 2,000 *private patients*, 39 had myopia of 10 D or more (far point at 4 inches or less), in one or both eyes. Three exceptional cases, viz., one of conical cornea, one of nystagmus, and one of hereditary syphilitic keratitis, are not included in the 39. The 78 eyes of these 39 persons may be classified as follows:—

M. of 10 D or more . .	64
M. of less than 10 D . .	13
E.	1
	78

Among the 64 highly myopic eyes, were eight with M of 20 D, or more. The acuteness of vision in the 64 highly myopic eyes, astigmatism as well as myopia being corrected, was as follows:—

V equal to	6-6ths	0	
,, ,,	6-8ths	4	
,, ,,	6-12ths	12	
,, ,,	6-18ths	24	
,, ,,	6-24ths	6	
,, ,,	6-36ths	3	
,, ,,	6-60ths	6	
,, less than	6-60ths	9	—(in 2 of these there was corneal opacity.)
		64	

Among 2,000 *hospital patients* 17 had myopia of 10 D, or more, in one or both eyes. One case of hereditary syphilis is excluded. The 34 eyes of these 17 persons may be classified as follows:—

M. of 10 D or more	27
M. of less than 10 D	5
E.	1
Excised	1
	34

Among the 27 highly myopic eyes were 7 of 20 D, or more.

Unfortunately my hospital registers give as a rule the refraction only, not the acuteness of vision, and I am therefore unable to compare the two groups in this latter respect.

I do not know whether Dr. Berry speaks from actual figures or from memory. It is very likely that we, most of us, see more cases of bad myopia in hospital than in private practice, for the reason that hospital patients are much more numerous than private patients. The question is one of proportion, which can only be answered by actual statistics. My own figures show a much higher proportion of very high myopias in private than in hospital practice (64 against 27 eyes, per 2,000 persons); on the other hand the extreme cases (20 D and above) form a relatively larger contingent in the hospital than in the private group, though they still are actually more numerous in the latter. This to a certain extent favours Dr. Berry's contention.

But supposing that the worst cases *are* disproportionately common among the poorer myopes, does this necessarily show that ordinary myopia has no tendency to pass into the severer type? The poor and ignorant are more prone, I think, than the better educated, to let the defect progress unheeded, to get no glasses, and to seek no advice, until they are practically disabled. Some of the worst cases which I have seen were in poor women who had plied the needle under the greatest difficulties until they were nearly blind. The following statistics from Horner's clinic bear upon the point:—Among 220 cases of disease of the macula, 81 per cent. were associated with very high myopia, and the large majority were in persons who had persistently strained their eyes in near work.*

Dr. Berry holds that the benign and the pernicious types of myopia are essentially different conditions,

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* Quoted by Emmert, Auge und Schaedel. Hirschwald. Berlin, 1880, p. 148.

etiologically as well as anatomically, but admits that they may co-exist. Are not the mixed cases extremely common, and do they not run a benign or a pernicious course according to the way in which they are dealt with? Let us suppose the case of a school-girl, fifteen years of age, and rather anæmic; who stoops much over her work; who has a myopia in both eyes of 4 or 5 D with moderate crescents, and with vision nearly normal when corrected; who has used no glasses, and whose complaint is that her eyes ache sometimes, and that she cannot see nearly so well as she could a year ago. Is this a benign or a pernicious case? Is the eye healthy or diseased? And, more important still, what is it going to be in the future? The etiology of such a case may be very complex, embracing hereditary predisposition, malnutrition of the tunics, and muscular action. We cannot apportion an exact value to each of these factors, but we can diminish the action of the latter two, and by so doing we can, in my opinion, influence the future course and type of the myopia. It is, of course, impossible to obtain an absolute proof of the efficacy of such interference, for we cannot treat any given case in two different ways at once. But it is a matter of frequent experience in such cases that after twelve months' heedless disregard of the advice given, the myopia is worse both in character and in degree, while after twelve months' attention to such advice, it shows no deterioration. We see cases with well-marked crescents which remain stationary for many years, and may fairly be called benign. On the other hand, we see middle-aged people who have prided themselves for many years on their sharp-sighted, short-sighted eyes, and who have yet come to serious disability in the end. Have not these latter, in their time, passed through a comparatively benign condition, and are we not justified in believing that timely advice would have obviated much, if not the whole, of the deterioration? Seeing that there

is in a very large number of cases no definable boundary line between benign and pernicious myopia, I think the onus of proof lies with those who assert that these conditions are essentially different in their etiology, and that the one has no tendency to pass into the other.

Dr. Berry admits that close application of the eyes exerts some influence on the progress of ordinary typical myopia, and he admits that the proper selection of glasses has some counteracting influence ; but he maintains that the nature of this influence for evil and for good is still unknown. In defence of his agnosticism he asks why it is that close application of the eyes in after life has not the same injurious tendency as in youth. Surely the difference is amply explained by the greater resisting power of the adult sclera. It is a fact, not a theory, that the sclera is more readily extended in youth than in after life ; this has been proved by physical experiments, and we have clinical evidence of it in the different effects of glaucomatous pressure in children and in adults. This fact gives strong support to the doctrine which affirms that myopia is largely dependent on over-strain of the sclera during the period of growth, and it is perfectly consistent with our experience that a sclera which has been much weakened in early life may continue to give way in later years under the same influences.

In opposition to the convergence theory, it is pointed out that just in those cases in which convergence is greatest, namely, in internal strabismus, the sclera does not suffer. The argument would be good if the degree of convergence could be accepted as a measure of the strain upon the sclera. But this is not so. The strain on the sclera depends on the resistance which the muscles have to overcome, and this varies much with the build of the eye. Emmert has shown that convergence involves least effort for the

hypermetropic eye, more for the emmetropic, most for the myopic.* We know well, that with the increase of myopia, the difficulty of convergence usually increases, and it is most reasonable to ascribe the aggravation of the myopia to the added resistance.

Even for the exceptional cases of high myopia in one eye only, where binocular vision and the ability to converge are lost, the convergence theory is not entirely at fault. If the patient reads with his emmetropic or hypermetropic eye, and accommodates in so doing, he must make the associated effort of convergence. The presumption is, that the failure to converge depends upon some special resistance due to the form or relations of the myopic globe.

The convergence theory finds further support in the nature and position of the choroidal change which is typical of myopia—the myopic crescent. This peculiar defect resembles no known primary disorder of the choroid. It differs from the atrophic ring which surrounds the disc in glaucoma in that it appears to represent, not a traction which is equal in all directions, but a traction in one particular direction. It is exactly that which one would expect to find as a result of a convergent effort greater than the tunics can support. Emmert's observations as to the effect of convergence on the position of the optic nerve seem to me very important in this connection.† For the more extensive changes in the choroid which belong to very high myopia the same explanation holds good.

But the difference between Dr. Berry's position and the one which I have endeavoured to advocate is, after all, only one of degree. He recognises, as positively known, no other factor than heredity in the production of myopia, but he agrees in the desirability of sup-

* Loc. cit. p. 157.

† Loc. cit. p. 133.

pressing it, if we can, and favours on general grounds the hygienic reforms and precautions which are commonly advocated. I claim that the current theory, as set forth in my previous paper, stands upon a mass of circumstantial evidence which amounts almost to proof; that we have clear indications for the control of myopia; and that it is our duty to act on them with energy and persistence.

A NEW OPERATION FOR SYMBLEPHARON.

By George C. Harlan, M.D.,

Professor of Diseases of the Eye in the Philadelphia Polyclinic.*

Symblepharon is such a notoriously difficult and unsatisfactory condition to treat, that any attempt to improve our methods of dealing with it may be considered at least excusable. All mechanical contrivances to prevent re-union and subsequent contraction of the divided surfaces have proved so futile that they have been generally abandoned.

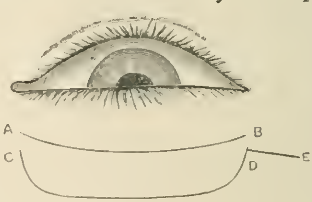
When adhesions have been stretched into membranous bands, a good result can generally be obtained by dissecting them up from the ball, folding them inwards so that their sound surfaces come in contact with the ball, and holding them in position by stitches passed through the lid and tied over pieces of cork or buck-skin on the skin; but when the whole lid is firmly and closely adherent to the ball, the only resource offering any

* Read before the American Ophthalmological Society, July, 1 90.

prospect of success has been the transplantation of rabbits' conjunctiva. This operation, which is difficult and tedious, has a history of some brilliant successes and a good many failures, and an unwritten history of a still larger proportion of the latter.

The very good substitute for mucous membrane, formed from skin, in a case in which it was necessary to make a new lower lid by a plastic operation after the removal of a large epithelioma, suggested the following procedure. The patient was a young mechanic whose eye had been injured by molten metal. The whole of the lower lid was firmly united to the ball, its margin crossing the cornea above the centre of the pupil.

The adhesion was freely dissected until the upward movement of the ball was entirely unimpaired; and an



external incision, represented at AB in the accompanying cut, along the margin of the orbit, was carried through the whole thickness of the lid, which was thus separated from its connections except at either extremity. A thin flap, CD, was then formed from the skin below the lid, care being taken to leave it attached at its base line by the tissue just beneath AB, as well as at the extremities. On this attachment it was turned upward as on a hinge, bringing its raw surface into contact with the inner surface of the lid, and its sound surface presenting toward the ball, and held in this position by suturing its edge to the margin of the lid.

In dissecting up the flap the incisions were carried more deeply, into the orbicularis muscle, when the base line AB was nearly reached, to enable it to turn more readily. The bare space left by the removal of the strip

of skin was easily covered without strain by making a small horizontal incision, DE, at its outer extremity, and forming a sliding flap. The operation was, of course, done with antiseptic precautions, and the parts were freely dusted with iodoform and covered with a bichloride of mercury compress. There was prompt union without a sign of suppuration.

Since doing this operation my attention has been called to one performed by Snellen which had escaped my notice. The two operations have nothing in common, however, but the dependence upon nature to manufacture mucous membrane out of skin. Snellen takes a long narrow flap from the cheek beyond the outer canthus, and passes it through a button-hole in the lid.

A CASE IN WHICH THE EFFECT OF HOMATROPINE UPON THE ACCOMMODATION WAS UNUSUALLY PROLONGED.

By G. E. de Schweinitz, M.D.,

Ophthalmic Surgeon to the Philadelphia and Children's Hospitals ; Ophthalmologist to the Infirmary for Nervous Diseases.

It has been well established that homatropine is a trustworthy mydriatic if properly employed, having the great advantage that its action upon the ciliary muscle is sufficiently pronounced to permit an accurate determination of the refraction error, while its effect is so transitory that the patient is but little inconvenienced. In the experiments of Schaefer (" Archives of Ophthalmology," vol. x. p. 204), after an average of 24 hours (minimum 16 hours but in one case after 2½ days) the pupil returned to normal. Risley (Transactions of the American Ophthalmological Society, 1881) found that the influence of homatropine began to diminish about

two hours after the last instillation, and in 24 to 30 hours had entirely vanished. Jackson (*Medical News*, July 24, 1886) observed that the shortest period between the last instillation and complete recovery was 23 hours; the longest less than 90. F. H. Hodges ("Archives of Ophthalmology," vol. xiv. p. 44) usually noted complete absence of effect in from 24 to 36 hours. The writer, in conjunction with Dr. H. A. Hare, in a research on the physiological action of this drug (*Medical News*, December, 1887), determined that recovery from ciliary paralysis took place from 18 to 72 hours after the last drop had been instilled into the conjunctival sac. When the impression persisted for a longer period than three days these observers believed that the specimen of homatropine was not perfectly pure. In contrast with the statements just quoted, the following case is of interest:—

A practising physician, aged 38, applied for the correction of his error of refraction (a mixed astigmatism), and a solution of homatropine (8 grains to the ounce) was used in cumulative instillations. September 18th, at 11 o'clock in the evening, one drop of the solution was applied in each eye. The following morning, September 19th, seven drops were introduced at intervals of fifteen minutes, the last being used at 12 o'clock in the day. Full paralysis of the ciliary muscle was not obtained, a dioptry and a half of accommodation remaining; neither was there *ad maximum* dilatation of the pupils. The error of refraction was measured in the usual way with the test-lenses, and retinoscopy as a control. On September 23rd, at 11 o'clock in the day, or 95 hours after the instillation of the last drop, the accommodation had not returned to normal, 3 D still remaining in abeyance. The following day, the 24th, or 119 hours after the last drop of the solution had been employed, the patient had not secured absolute control of his previous amplitude of accommodation, 2 D being wanting; this, moreover, in

spite of the fact that on the previous evening, and again early in the morning, he had instilled into his eyes a weak solution of eserine, 1-36 of a grain to the ounce. Some time during the next day the effect of the drug vanished ; the exact hour was not noted.

The most reasonable explanation of this prolonged effect of homatropine upon the accommodation would seem to be that the drug was an impure article, perhaps contaminated with atropine, were it not for the fact that the same solution was used in another case for the purpose of testing this point, and full ciliary paralysis secured by precisely the same number of instillations, with complete recovery in twenty-two hours. This physician, three years ago, used homatropine in his eyes in quite a similar way, although not by instillations so frequently applied, and states that he did not recover his power of accommodation for four days. No exact measurements of this experience are at hand, but his own observations at the time were carefully conducted.

It is evident that in exceptional instances the effect of homatropine upon the ciliary muscle is prolonged beyond the period usually given, and the statement of the possibility of such anomalous action should be made to patients to whom the drug is given. The explanation of this case, or of similar cases, is not very evident, but perhaps may be solved by assuming an idiosyncrasy on the part of the patient. There are a number of cases on record in which persistent mydriasis has followed the use of the stronger mydriatics, in some of these examples the effect lasting for weeks and months. Stubborn mydriasis, unaccompanied by equivalent loss of accommodation, after the use of homatropine, has been reported by Wadsworth (Transactions of the American Ophthalmological Society, 1889) without any satisfactory explanation of the phenomenon having been obtained.

FORSTER (Breslau). Cortical Blindness.—*V. Graefe's Archiv, XXXVI. 1, p. 94.*

In November, 1884, a man aged 44, found his sight affected suddenly by what was ascertained to be right-sided hemianopsia. The lines of demarcation passed from 1° to 2° to the right of the fixation points in the horizontal meridian, and also left small portions of the right fields intact above and below the fixation points—the upper portion best marked in the right, and the lower in the left eye. The patient read ordinary print slowly, and the smallest type with $+4D$; $V=\frac{1}{3}$. Hemianopic pupil reaction not present—at least not to be demonstrated. Left pupil smaller and more active than right. No vertigo, nor any symptom except pain, in left frontal region. This disappeared under mercurial inunction, and vision rose to $\frac{2}{3}$. Hemianopsia unchanged. Vision nearly normal five months later, and patient returned to his work in a post office.

On August 10th, 1889, after climbing a mountain, his sight became worse, but he descended (three hours) unaided. His brother noticed a loss of memory during the descent. Next day he walked by himself till noon, but required a guide during the afternoon. His sight improved again after this, but next day failed so entirely that he required to be led about like a blind man. Six weeks later, Förster saw him. Pupils wide, but reacting slightly. Large type hardly deciphered, but Snellen's $1\frac{1}{2}$ read correctly, though slowly, with either eye. The perimeter showed that only a very small portion of the central fields existed on each side; about 1° from the fixation point to the right, 2° to the left and downwards, and $2\frac{1}{2}$ downwards to the right. The fields did not extend above the horizontal meridian. $V=\frac{1}{3}$. Colour vision completely lost. The ophthalmoscope detected nothing abnormal, and urine and heart were healthy.

Förster attributes both attacks to thrombosis of vessels in the cerebral cortex. The absence of severe constitutional symptoms, and of paralysis and loss of consciousness, are in favour of this view, as also the loss of memory, the dulness with which the patient accepted his blindness, the reaction of the pupils to light, and the gradual nature of the second attack.

One would expect to find in such a case a large defect in the visual memory pictures (optische Erinnerungsbilder), as so much of the occipital cortex was destroyed ; but this symptom was not present, although the visual memory (Gedächtniss) was in other respects severely affected.

Neither aphasia, alexia, nor agraphia were present, nor was the patient's vocabulary lessened. Soul-blindness completely absent ; but one remarkable defect existed : the patient had altogether lost the power of conceiving the mutual relations of objects in space. In spite of his possessing good vision in his minute visual fields, he had less power of guiding himself about his room and the corridors than patients whose two eyes were bandaged up for a couple of days. After three weeks' residence in it, the topography of his room was quite unknown to him. He had no idea of it in his sensorium. The power which he had lost cannot be termed the form sense, as that term is otherwise employed, and Förster applies to it the name "Ortsgedächtniss," which we may perhaps express as "space-sense." This space-sense, then, no matter how its ideas are acquired (by sight or touch, etc.), must be closely related to the occipital cortex.

Förster's patient had so completely lost this particular faculty that he could not describe the office in which he had worked four years ; *i.e.*, he could not describe the relations of the windows, the tables, etc. He could not describe his own house either. He knew he had to go up a flight of stairs, but could not recollect whether the door there was to the right or left or in front. He seemed to have lost the conception of right and left utterly. He was unable to tell whether he should turn to the right or left when going through streets whose names he remembered well, to and from places which had been his daily resort,

He could draw no correct maps. He drew Spain, France, and Portugal, with Portugal above, then Spain, and France at the bottom. When asked to draw Italy he smiled and said a boot, and then drew—not Italy indeed—but a very correct boot.

It has often been observed in hemianopsia that the fixation points are unaffected, the line of demarcation lying from 2° to 4° away from them. Sometimes a band of defective sensation lies along the demarcation line, but the hemianopic defect never crosses to the sound side of the fixation point. The explanation which has been accepted for this phenomenon is that in the macular region the fibres of the fasciculus cruciatus anastomose with those of the fasciculus lateralis of the opposite side, so that both tracts contribute to the nerves of this region. The symptoms of Förster's case are not in accord with such a theory. If the small portion of the right fields left after the first attack only owed its preservation to its being supplied by fibres from the right tract, it should have disappeared entirely after the second attack, and absolute amaurosis have ensued. Indeed, this is what theoretically should result from bilateral hemianopsia, and yet we see in Förster's case that it does not do so, but that in each field just that portion persists which is generally left unaffected in ordinary hemianopsia. Also if this intermingling of the fibres from the two tracts occurs in the macular region, there should have been after the first attack some slight defect to the left of the centres of the fields, but this was not the case.

Before advancing his own theory, Förster refers to the anatomy of the cortical arteries. According to the researches of Heubner, Duret, and Decke, the branches of the six principal arteries do not pass directly into the brain substance, but are distributed to the white matter and large ganglia in a different fashion than they are to the cortex. The former are supplied by a number of small branches springing directly from the large arteries before the latter break up into smaller vessels. The cortex is supplied by branches springing from the extensive network which is formed by the anastomosis of all the large vessels, and which spreads all

over the pia mater. These branches run for a short distance in the pia parallel to the surface, and then pass in at a right angle to supply the cortex. We must assume, with Munk, that the visual centres have an arrangement corresponding to that of the retinal elements, so that neighbouring retinal elements correspond to neighbouring cortical perceptive elements, and that therefore there exists in each occipital lobe a place of most distinct vision.

Förster's hypothesis is based on the assumption that this cortical centre of most distinct vision is more richly supplied with blood by the anastomosis of two or more vascular districts than is the surrounding cortex, and he points out the analogous arrangement in the blood supply of the macula lutea, which gets blood from the two temporal branches of the central artery, and also from the macular arteries. This arrangement would allow the centre of most distinct vision to obtain a blood supply when the rest of the cortex was starved by thrombosis of the principal artery of the occipital lobe, and would account for the improvement in central vision, which his case exhibited after the first attack, by the gradual more complete development of this anastomosis. The same explanation of course is applicable to the second attack, and the conclusion may be drawn, that if the line of demarcation in a case of hemianopsia goes directly through the fixation points, the lesion is probably not in the cortex, but in the course of the tractus opticus. The hemianopic pupil reaction will come in to assist this diagnosis.

Förster sums up his conclusions as follows :—

1. The frequent exclusion of the maculæ from implication in hemianopic defects is not due to the mingling of fibres from the two tracts in this region, but to the happy vascular relations of the centres of most distinct vision.

2. Bilateral hemianopsia is not necessarily associated with complete loss of function in both right and left visual fields.

3. The occipital cortex is the seat of topographical perceptions, no matter how acquired—by sight, touch, or sense of muscular movement.

4. A small cortical district is not sufficient for colour perception, even if the retina be intact. Colour sense suffers

sooner in malnutrition of the cortex than the form perception of the smallest letters.

5. Destruction of the occipital cortex does not produce atrophy of the optic nerves.

J. B. S.

VALUDE & VIGNAL (Paris). On the Value of Aniline Colours as Antiseptics.—*Arch. d'Ophthal.*, *Sept.—Oct.*, 1890.

This paper, which was communicated to the International Congress at Berlin, contains the results of some experiments undertaken by the authors after the publication by Stilling of a paper giving an account of the excellent results he had obtained with pyoctanin (see OPHTH. REVIEW, July, 1890). Under this term are included aniline violet and yellow. The authors experimented with these two substances obtained from Merck, as recommended by Stilling, and the conclusions regarding their germicidal properties are at variance with those of Stilling, and nearly agree with those of Carl and Graefe. In cultivations of Streptococcus pyogenes and of Staphylococcus pyogenes aureus, in a given quantity of *bouillon*, as much as 0.35 grm. of the aniline colours was required to arrest growth, whereas for an equal quantity of *bouillon* 0.015 grm. of corrosive sublimate was effective. A smaller dose of the aniline colours retarded but did not arrest the growth of the microbes, and Vignal and Valude note that a group of cocci stained by these colours is not necessarily inert.

Their clinical experience with these reagents practically bore out the conclusions to which they were led from their cultivation experiments. A solution of pyoctanin, 1 : 1000, proved quite inefficacious in all the cases of purulent ophthalmia neo-natorum in which it was employed, and the same was true of cases of simple catarrhal conjunctivitis. In infective ulcers of cornea the results were variable ; the only patient who definitely benefited by the use of pyoctanin was a man, æt. 50, who had been treated for hypopyon ulcer

of some days' duration by eserine and iodoform. Yellow pyoctanin in solution, 1 : 1000, applied four times daily, led to decided improvement in four or five days.

Valude and Vignal conclude that the diffusibility of the aniline colours renders them of considerable value in cases of corneal ulceration, in which corrosive sublimate is of less value in consequence of its non-diffusibility; but that in conjunctival cases, purulent and non-purulent ophthalmia, their feebleness as germicidal agents puts them out of count, when compared with bichloride of mercury. They should be employed in stronger solution than is usual with sublimate, and applied accurately to the diseased part.

J. B. L.

De Lapersonne (Lille). On the Pathogenesis of certain forms of Mydriasis.—*Arch. d'Ophtalmol., Sept.—Oct.* 1890.

In this communication the author brings forward some clinical facts favouring his views regarding the physiology of the dilatation of the pupil, and offers an explanation of the nature of some of the varieties of mydriasis designated by such terms as idiopathic, essential, reflex, etc.

In these cases, after excluding all cases of paralysis of the sphincter of the iris, most writers agree in attributing the dilatation to the action of the radial muscle of the iris, excited by the sympathetic nerves.

That the cervical sympathetic, when subject to irritation, exerts an influence upon the size of the pupil, is sufficiently well established. The author does not believe in the radial muscle of the iris, and seeks proof of some other means by which the dilating effect of the sympathetic upon the pupil can be explained.

He examined three cases of unilateral mydriasis—two without obvious cause, one traumatic—and in these he found also considerable diminution in the amplitude of accommodation. In irritative mydriasis the interference in

the pupillary reactions has been stated to be frequently independent of ciliary muscle weakness. De Lapersonne suggests that probably the loss of accommodation in these cases has not been commensurate with the dilatation of the pupil, although present in some degree. If in the writer's cases the existence of a dilator pupillæ muscle is admitted, then we have to suppose that the same cause in the same individual produced effects entirely opposed to each other—viz., irritation of the sympathetic, leading to the contraction of the dilator pupillæ, and paresis of the ciliary nerves causing insufficiency of the ciliary muscle. But excitation of the sympathetic will alone explain the conditions, in the absence of a dilator iridis, by assuming that the same inhibitory influence is exercised upon the two muscles, the sphincter iridis and the ciliary muscle.

The balance of evidence is now decidedly adverse to the presence in the human iris of any radial muscular fibres; the researches of Grünhagen, Schwalbe, and, more recently, of Fuchs, Boé, and others, having almost proved this point. De Lapersonne considers that the clinical evidence is also very strong, and that it is easier to explain cases of mydriasis such as he relates without the intervention of a dilator muscle, whose anatomical existence is itself highly problematical.

J. B. L.

Gowers (London). A Manual and Atlas of Medical Ophthalmoscopy. Third Edition, with the assistance of Marcus Gunn, M.B., F.R.C.S. *London: J. & A. Churchill.*

A work which has reached its third edition is independent of criticism, and the present work has both proved its position and added not inconsiderably to the well-deserved reputation of its author. It has been most carefully revised throughout, and bears evidence of the revision on almost every page and in almost every paragraph, as the

author himself says. In this revision he has been assisted by Mr. Marcus Gunn, whose well-known accuracy and experience in ophthalmoscopic observation gives additional weight and value to what was already a medical classic.

In addition to the smaller changes, which are very numerous, there are certain more important alterations. The interesting cases, recorded in detail, which formed a considerable part of the previous editions, have, Gowers considers, answered their purpose, and he has replaced them by short epitomes, using the space so gained for an account of the best methods of drawing the fundus. New ophthalmoscopic figures have been added, and the figures of microscopic sections, formerly at the end of the work, have been transferred to the text.

The work is, as heretofore, produced in a form most creditable to those responsible, and altogether it fully sustains the reputation gained by the past editions.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, NOVEMBER 13TH, 1890.

HENRY POWER, F.R.C.S., President, in the Chair.

Operations for Ptosis.—Dr. Berry (Edinburgh) commented on most of the operations for the relief of ptosis, but more especially upon the methods devised by Eversbusch and Snellen, and called by their names. He had performed Eversbusch's operation eleven times, and Snellen's six times, but had not always been satisfied with the results. However, in any case of ptosis, which calls for operation at all, he advised the employment of one of these two methods, because they are capable of producing at least as great an effect as any other operation, and because they admit of repetition if necessary, with a good chance of further improvement, or they may be followed by another operation, such as that suggested by Panas.

The President mentioned cases in which he had shortened the tendon of the levator palpebræ.

Mr. Tatham Thompson (Cardiff) stated that he had not found the method advocated by Professor Snellen effective. He had found it necessary to have recourse to subsequent shortening of the levator palpebræ by inserting threads.

Mr. Lang said that in cases operated on by Snellen's plan, if he had not tied the threads over a piece of drainage tube, they had sunk in to the skin, and given rise to small abscesses. Four cases had been operated upon, in all of which suppuration occurred. Lately he had adopted Panas's operation, employing, however, a curved incision instead of a flap, with excellent results.

Mr. Juler had employed Pagenstecher's subcutaneous suture with admirable results ; particularly in his last three cases.

Mr. Mackinlay described a method employed by Mr. Hulke. A Graefe's knife was inserted at the outer extremity of the lid and passed along so as to separate the skin from the orbicularis muscle ; the knife was then withdrawn, and the skin puckered and maintained in a large wide fold by stitches. More recently he had himself preferred making three small folds instead of one broad one, and maintaining them by the insertion of stitches till the end of the second week. There had been no suppuration. The results were good, but when the affection was unilateral he had not seen complete symmetry restored.

Mr. McHardy thought Pagenstecher's operation was the best.

Mr. Doyne mentioned three cases in which he had employed Snellen's operation, using three sutures. One had suppurated, but in all there was decided improvement. He thought that, considering how many structures were involved, perfect results could not reasonably be expected.

Dr. Berry briefly replied to the remarks of other members.

On Individual Differences in the Degree of Latent Lateral Deviations of the Eyes on Looking Upwards and Downwards.—Dr. Berry communicated the results of experiments he had made upon students and others in reference to the point above mentioned, and illustrated his remarks by diagrams. Fifty cases were examined by Maddox's glass-rod test, and of these the degree of convergence was the same on upward as on downward fixation in nine ; it was greater on downward than upward fixation in twenty-eight ; and it was greater on upward than downward fixation in thirteen. The main conclusion drawn from the investigation was that increase in convergence downwards is only about twice as frequent as increase in convergence upwards. Dr. Berry referred to the increase in the separation of the images in sixth-nerve paralysis, which, usually, though not invariably, occurs on looking down, and suggested that in these cases the increase may be not only the difference in latent devia-

tions on upward and downward fixation, but also the difference in the effort made to unite the double images in the two positions.

Mr. Wray said that in cases of latent deviation, for the examination of which he employed Stevens's phorometer, he had generally discovered inequality of visual acuity in the two eyes. He suggested that it would facilitate the comprehension of intricate subjects such as that under consideration if the members of the Society were supplied with an abstract of the paper beforehand.

Mr. Priestley Smith thought that Dr. Berry's paper and diagrams showed that there was not that close connection between downward movement of the eyes and convergence, and upward movement and divergence, as was formerly supposed to exist. He thought, also, that the presence of latent deviation might account for the giddiness from which many people suffered in looking down from a height, and the vertigo and headache often experienced in looking up—for example, in picture galleries—for a length of time.

Dr. Berry, in reply, stated that the experiments were all performed with the eyes directed to a distance of five mètres, so as to ensure approximate parallelism of the optic axes. The chief question was, whether the phenomena described depended upon physiological or anatomical conditions.

Case of Double Hemianopsia.—Messrs. H. R. Swanzy and Louis Werner communicated this paper. They alluded to Munk's and Schafer's experiments on the dog and monkey, which showed that a definite correlation existed between certain parts of the occipital lobes and different segments of the retina. In man also the same correlation was shown to exist in a case by Dr. Henry Hun, in the *American Journal of Medical Sciences* for January, 1887, where, after an apoplectic seizure, a man lost the left lower quadrant and peripheral part of the left upper quadrant in each field, owing to a lesion discovered at the necropsy two years later, which involved the lower half of the right cuneus. This case seemed to prove that the fibres from the right upper quadrant of each retina terminate in the lower half of the right cuneus; and that the fibres from the lower quadrant of each retina terminate in the

upper part of the right cuneus, or in the right gyrus lingualis, and most likely the latter, is rendered probable by a study of recorded cases. A similar relationship would of course exist between the left quadrants of each retina and the left cuneus and gyrus lingualis. The subject of the present communication was a man æt. 42, who had an apoplectic seizure, and was unconscious for three weeks. On his recovery he was unable to raise his left arm, gave contradictory accounts of himself, and had lost the right upper and both lower quadrants of each field. The remaining quadrant in the left field was accurately defined, but in the right extended a little into the left lower and right upper quadrant. The nature of the lesion was most probably hæmorrhage ; and from the impossibility of indicating a position in which one lesion would be likely to produce the hemianopsia and brachial monoplegia, the authors concluded that there were two distinct lesions in the right hemisphere. A lesion of the internal capsule involving arm and vision must have included the leg + sensation, which were not affected in this case. The paralysis of the arm was most probably due to a cortical lesion, and the loss of portions of the lower quadrant of the visual field was almost certainly due also to a lesion in the cortex, the only other situation which suggests itself being the optic radiations, where such a restricted invasion of the fibres is scarcely to be expected. Furthermore, in the light of Hun's case this lesion was in the lower half of the right cuneus. The lesion in the left side of the brain, causing loss of the right half of each field, cannot be localised with so great a degree of probability. The absence of concomitant symptoms referable to that side of the brain suggests its site in the optic tract, radiations, or cortex. The absence of the hemiopic pupil negatives the tract, and the optic radiations are unlikely, for the reasons adduced above ; hence the lesion was also probably cortical, and situated in the left cuneus and gyrus lingualis.

Dr. Beevor thought that there must have been a double lesion, and referred to a somewhat similar case recorded by Dr. Hughes Bennett, in which after death two lesions were discovered, one in the internal capsule and one in the cuneus.

A Case of Hemianopsia.—Mr. Richard Williams (Liverpool) read notes of the case of a miner, æt. 42, who had neuroretinitis and very marked horizontal limitation of the fields of vision, the lower half of the right and the upper half of the left field being lost. He remarked that cases of horizontal hemianopsia were by no means common, but the loss of the upper half of one field and the lower half of the other rendered the present case unique in medical literature, though the possibility of this condition had been suggested by Wilbrandt.

A Case of Alexia.—Mr. Richard Williams described this case, occurring in a man æt. 57. He could see words distinctly, but appeared as if beginning to learn to read, and could make no sense of them. He wrote readily from dictation, but could not afterwards read what he had written. After he had written part of a letter spontaneously, he was unable to read it, though he could recall the sense. Memory was somewhat defective, and he was more emotional than usual, but could name surrounding objects without difficulty. The fields of vision presented the usual characters of right homoymous hemianopsia, the blind area reaching to within about 10° of the point of fixation. Otherwise the appearance of the eyes was normal. Improvement was very slow and incomplete.

Living and Card Specimens.—Messrs. Critchett and Juler: Epithelioma of Cornea and Conjunctiva.

Mr. Stanford Morton: Detachment of Vitreous.

Mr. Stephenson: Bifurcating Retinal Veins.

Mr. Wray: Two cases of Retinal Detachment.

FRIDAY, NOVEMBER 14TH, 1890.

Abstract of the Bowman Lecture on "Sir William Bowman's Work in Relation to Ophthalmology."

BY J. W. HULKE, F.R.S.

In his introductory remarks the lecturer said that the Ophthalmological Society was deeply indebted to Sir William Bowman, as one of its chief founders, its first President, and a warm supporter since he had ceased to preside at its meetings. He then gave an interesting and detailed account

of Sir William Bowman's work in Ophthalmology, referring to his contributions to the literature of this science in chronological order.

The discovery of the ciliary muscle was made here by Bowman, and in Germany by Brücke, almost concurrently, and formed the anatomical basis of a theory of "accommodation" which yet held good. The "Lectures on the Anatomy of the Parts concerned in the Surgical Operations on the Eye," delivered by Sir William Bowman soon after his first connection with the Royal London Ophthalmic Hospital, and published in 1846 in the form of a book, admirably met the want felt fifty years ago of a sound treatise on the microscopic anatomy of the eye. The "anterior elastic lamina" of the cornea and the interstices in the corneal tissue, there made known, soon received the familiar names of "Bowman's membrane," "Bowman's tubes."

Mr. Hulke then alluded to improvements which had originated out of the practice of slitting up the lacrymal puncta and canaliculi devised by Sir William Bowman, first practised by him for epiphora due to displacement or closure of the puncta, and subsequently extended to the treatment of obstructions of the nasal duct, and their consequences. This method, its development and its applications, were described in two papers—one published in the *Transactions of the Royal Medical and Chirurgical Society* in 1851, and the other six years later, in the *Ophthalmic Hospital Reports*, vol. i., 1857. For dividing strictures of the canaliculi Sir William Bowman devised a cannula lancet, which was figured in the *Annales d'Oculistique*, vol. 1855-56. It was in principle a miniature urethrotome *caché*.

For the operative treatment of ptosis, particularly of congenital forms, he devised a highly ingenious plan of looping up bundles of the orbicularis palpebrarum muscle, with an extremely fine silk thread inserted close to the free border of the lid, and of giving to these bundles a vertical direction by connecting the closed end of the muscular loop with the brow, through the mediation of a cicatricial band which should play the *rôle* of a minute "tendon of origin." He also adapted this procedure to the correction of entropion

of the lower eyelid. The subcutaneous plan of operating for squint, devised by the late George Critchett and elaborated in conjunction with him by Sir W. Bowman, was a great improvement upon the earlier method of a free section of the tendon with all the tissues overlying it. In connection with this subject Sir William Bowman devised a ready, and for most clinical purposes sufficiently accurate way of measuring and recording the amount of deviation of the squinting eye, by noting the interval between the lower ends of two imaginary vertical lines dropped through the centre of the pupil upon the lower eyelid, one in the faulty, the other in the correct position of the eye with reference to the lid.

Another subject in the operative treatment of which Sir William Bowman took much interest was conical cornea. A paper on the subject was published by him in the *Ophthalmic Hospital Reports*, vol. ii., pp. 134-67, 1859. In the surgical treatment of cataract, discission, in the early years of Sir William Bowman's active service at the Royal London Ophthalmic Hospital, was much more widely employed than now. Mr. Hulke had notes of three cases in which Sir W. Bowman practised it in 1849, the ages of the patients being 60, 64, and 65 years. In the softer forms of cataract of early life discission still held its ground, but the relatively long time occupied in solution, even in the soft forms of cataract, must often have led surgeons to wish for some speedier way. Gibson sought to shorten the time occupied in solution by evacuating the lens, just broken up with a cutting needle, through a small corneal incision made with the same needle with which he had comminuted the lens. For the more thorough removal of softened pulpy lens tissue slender channelled evacuators and also suction instruments were invented. Of suction instruments the two best adapted forms were tubes exhausted by the operator's mouth, and syringes. Of the latter, one of the best was the syringe devised by Sir William Bowman, and bearing his name. This he used not merely for the withdrawal of the opaque lens tissue by suction, but in a few instances he endeavoured also to remove the last vestiges of lens by washing out the chambers with distilled water injected with the syringe.

Gibson's linear extraction was a procedure in which Sir William Bowman felt much interest, and to the perfecting of which he gave much thought.

The first demonstration of the true nature of the appearances exhibited by the form termed zonular or lamellar cataract was given by Sir W. Bowman when Professor of Physiology in King's College, about the year 1846. Depression, which had fallen into disuse, was in 1854 revived by Sir W. Bowman, who tried it in several cases in the Royal London Ophthalmic Hospital. Larger experience of the operation, however, showed that not infrequently it was followed by an insidious cyclitis, promoted apparently by the presence of the displaced lens, and this persisted and implicated the other structures of the globe, in spite of treatment, and finally involved a total loss of sight. This seemed one of the principal reasons why depression was soon again relinquished.

The methodical combination of iridectomy with extraction, through a corneal incision of less extent than that made in the older flap method of extraction, effected by the aid of a traction instrument originated by A. von Graefe, was adopted in 1860 by Sir W. Bowman and his colleagues at the Royal London Ophthalmic Hospital. Sir W. Bowman's modification of the scoop was figured in a paper published in vol. iv., 1865, *Ophthalmic Hospital Reports*, entitled "On Extraction of Cataract by a Traction Instrument, with Iridectomy, with remarks on Capsular Obstructions." Extraction up to about the year 1850, in London, was performed generally in the manner now designated flap extraction, to distinguish it from a later procedure devised by A. von Graefe. It was performed under difficulties now known to few, and it certainly demanded much greater dexterity, for no speculum was used, but the operator himself raised and fixed the upper eyelid, his assistant depressing and fixing the lower lid: fixation forceps were not known, the eyeball was steadied only by the operator's finger tip applied at its nasal side in opposition to the pressure of the knife as this punctured and crossed the anterior chamber. Mr. Hulke said he had a vivid recollection of many such operations brilliantly executed by

Sir W. Bowman. In London, Sir William Bowman was, he believed, the first surgeon who employed chloroform in extraction. One inconvenience attending the use of Beer's knife—wrongly so called—in extraction, was the difficulty of making with it an uniformly curved regular section of the cornea. With the narrower knife devised by Sichel the operator could regulate the corneal incision with great nicety, and in Sir W. Bowman's hands this knife quickly replaced Beer's knife previously in general use. Later still, Sir W. Bowman used the yet more narrow knife known as Graefe's, and adopted the form of extraction which bore the name of that illustrious oculist.

The inefficacy of pharmacal therapeutics to cure, or even to control, the conditions comprised under the general designation "detached retina," "subretinal dropsy," must have often originated the idea of treating these accumulations of fluid directly by paracentesis. Some cases were so treated by Sir William Bowman at the Royal London Ophthalmic Hospital in 1864, but the results did not encourage an extensive trial of this method. A paper on this subject by Sir William Bowman appeared in the *Ophthalmic Hospital Reports*, vol. iv., p. 113, 1864.

The epoch-making paper on "The Treatment of Glaucoma by Iridectomy," by A. von Graefe, in 1857, interested Sir William Bowman deeply, and he at once began an extensive trial of the operation at the Royal London Ophthalmic Hospital. His great example and influence, together with those of his colleagues, soon won for it here the general approval it still retains. He published on this subject papers entitled "Iridectomy in Glaucoma," *Med. Times and Gazette*, 1860; "Glaucomatous Affections and their Treatment by Iridectomy," *Brit. Med. Journal*, 1862; and "Glaucoma and Iridectomy," *Ophthal. Hosp. Reports*, vol. iv., 1863. In connection with glaucoma, a communication by Sir William Bowman on "Cases of Misplaced, Malformed, and Dislocated Lenses, in some of which Glaucomatous Symptoms developed," published in the last-named Reports, was also interesting and valuable.

Sir William Bowman invented a combined cutting needle and hook for use in the operation of iridodesis for the formation of artificial pupil, which enabled the operator

to effect with one instrument the corneal puncture and the seizure of the pupillary margin. A paper on "Artificial pupil and the Needle Hook" appeared in the *Med. Times and Gazette* in 1852.

Mr. Hulke in conclusion said that, in the rapid advance of ocular surgery which the last half-century had witnessed, the first President of the Ophthalmological Society had in this country played a most important *rôle*.

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